FIG. 1

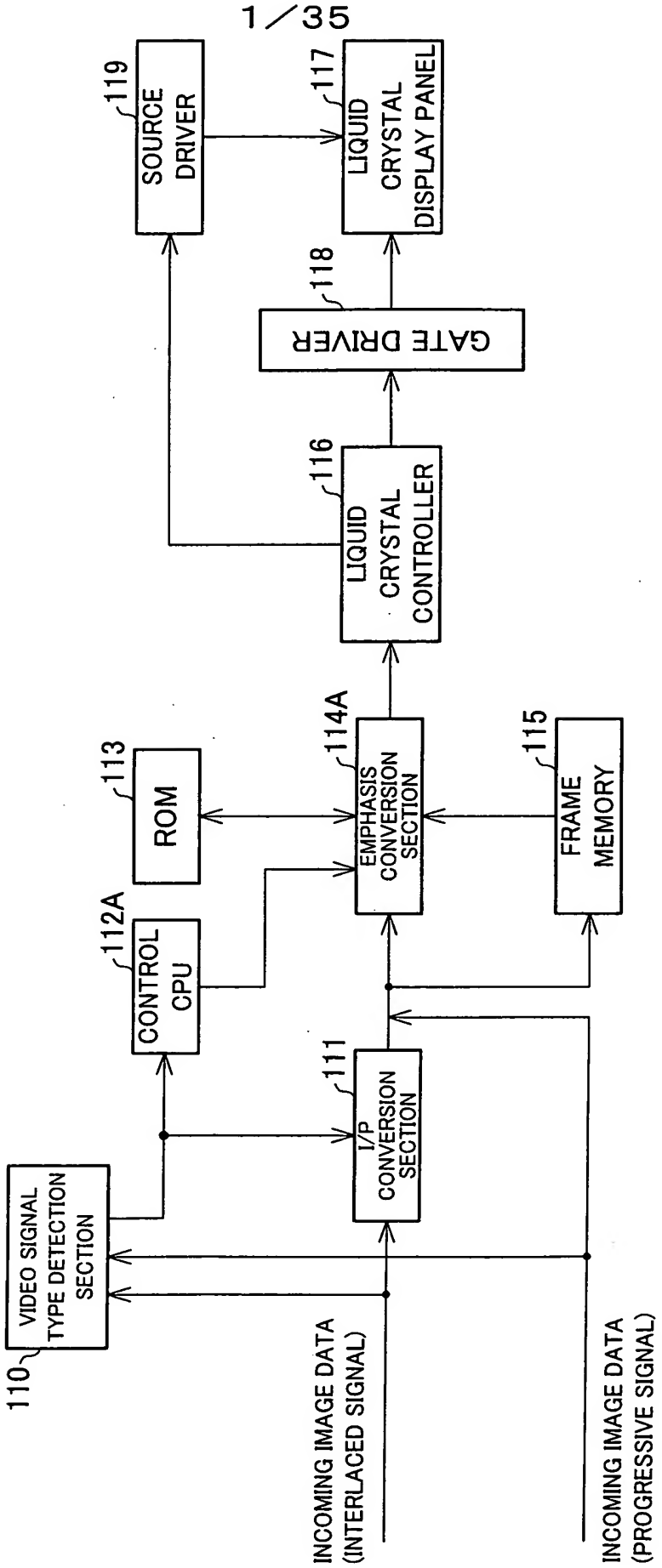

110
VIDEO SIGNAL TYPE DETECTION SECTION
INCOMING IMAGE DATA (INTERLACED SIGNAL)
INCOMING IMAGE DATA (PROGRESSIVE SIGNAL)
111
I/P CONVERSION SECTION
112A
CONTROL CPU
113
ROM
114A
EMPHASIS CONVERSION SECTION
115
FRAME MEMORY
116
LIQUID CRYSTAL CONTROLLER
118
GATE DRIVER
119
SOURCE DRIVER
117
LIQUID CRYSTAL DISPLAY PANEL

FIG. 2

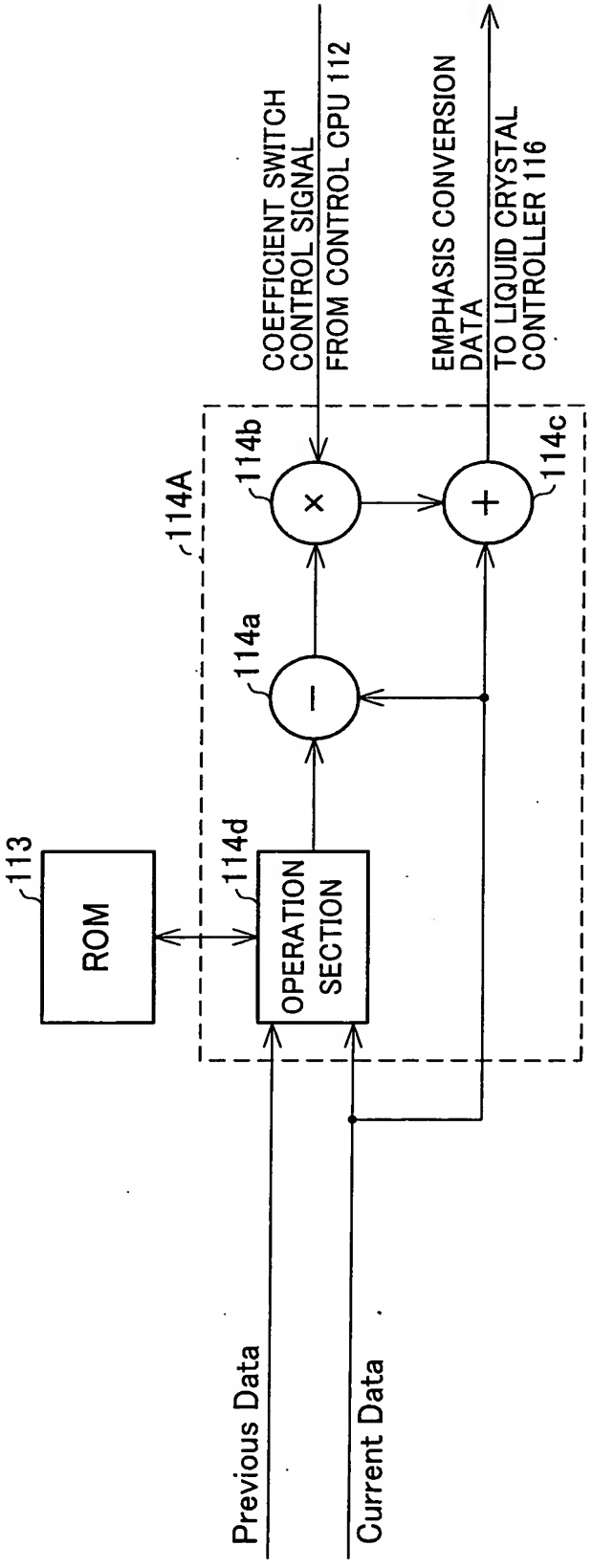

COEFFICIENT SWITCH CONTROL SIGNAL
FROM CONTROL CPU 112
EMPHASIS CONVERSION DATA
TO LIQUID CRYSTAL CONTROLLER 116
114A
114b
114c
114a
114d
113
ROM
OPERATION SECTION
Previous Data
Current Data

FIG. 3

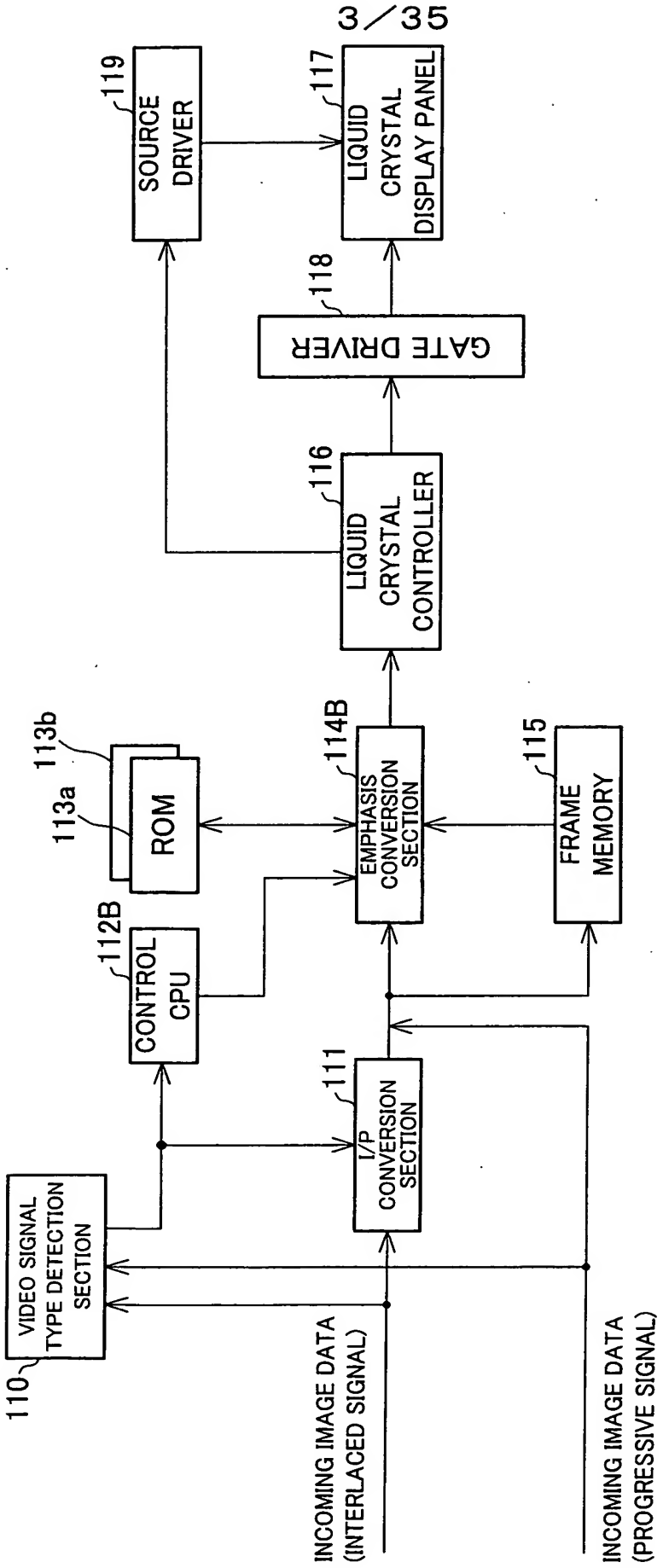

110
VIDEO SIGNAL TYPE DETECTION SECTION
INCOMING IMAGE DATA (INTERLACED SIGNAL)
INCOMING IMAGE DATA (PROGRESSIVE SIGNAL)
111
I/P CONVERSION SECTION
112B
CONTROL CPU
113a
113b
ROM
114B
EMPHASIS CONVERSION SECTION
115
FRAME MEMORY
116
LIQUID CRYSTAL CONTROLLER
118
GATE DRIVER
119
SOURCE DRIVER
117
LIQUID CRYSTAL DISPLAY PANEL

FIG. 4

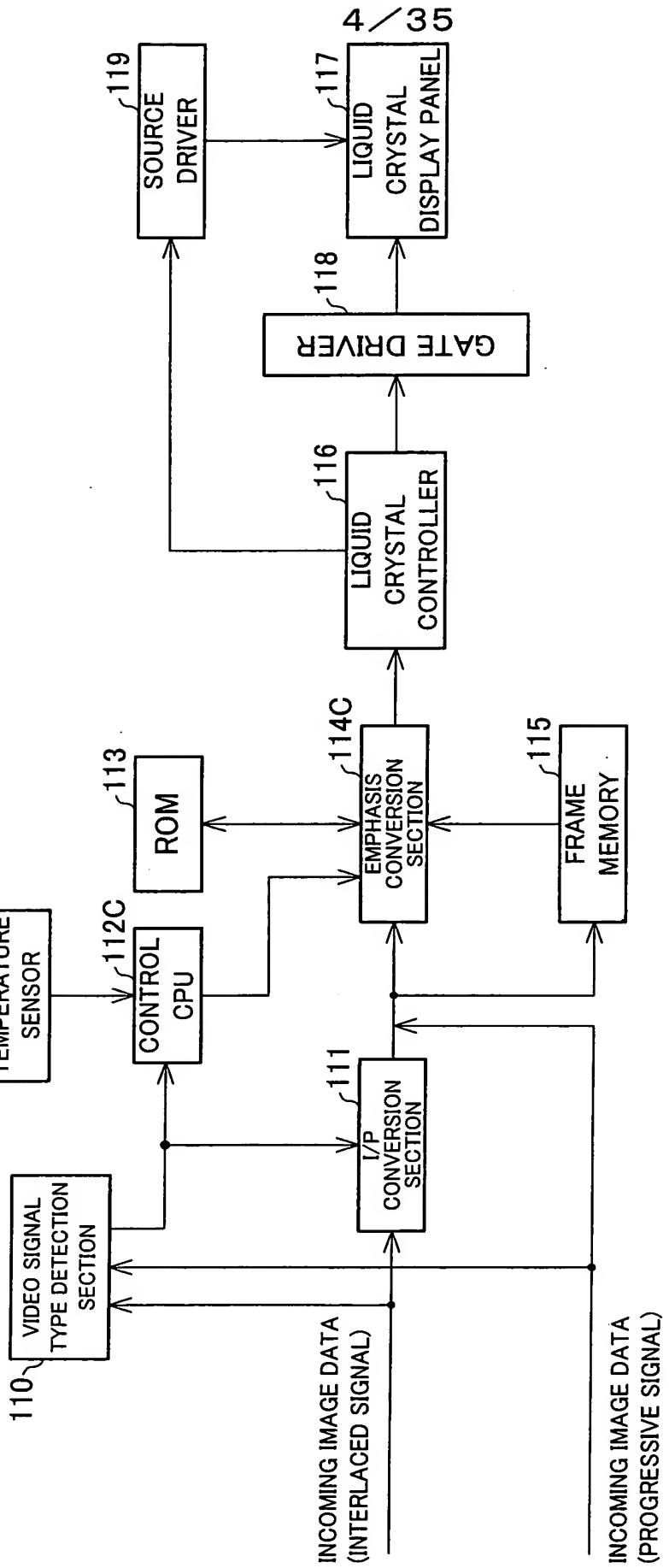

110
VIDEO SIGNAL TYPE DETECTION SECTION
INCOMING IMAGE DATA (INTERLACED SIGNAL)
111
I/P CONVERSION SECTION
INCOMING IMAGE DATA (PROGRESSIVE SIGNAL)
120
TEMPERATURE SENSOR
112C
CONTROL CPU
113
ROM
114C
EMPHASIS CONVERSION SECTION
115
FRAME MEMORY
116
LIQUID CRYSTAL CONTROLLER
118
GATE DRIVER
119
SOURCE DRIVER
117
LIQUID CRYSTAL DISPLAY PANEL

FIG. 5

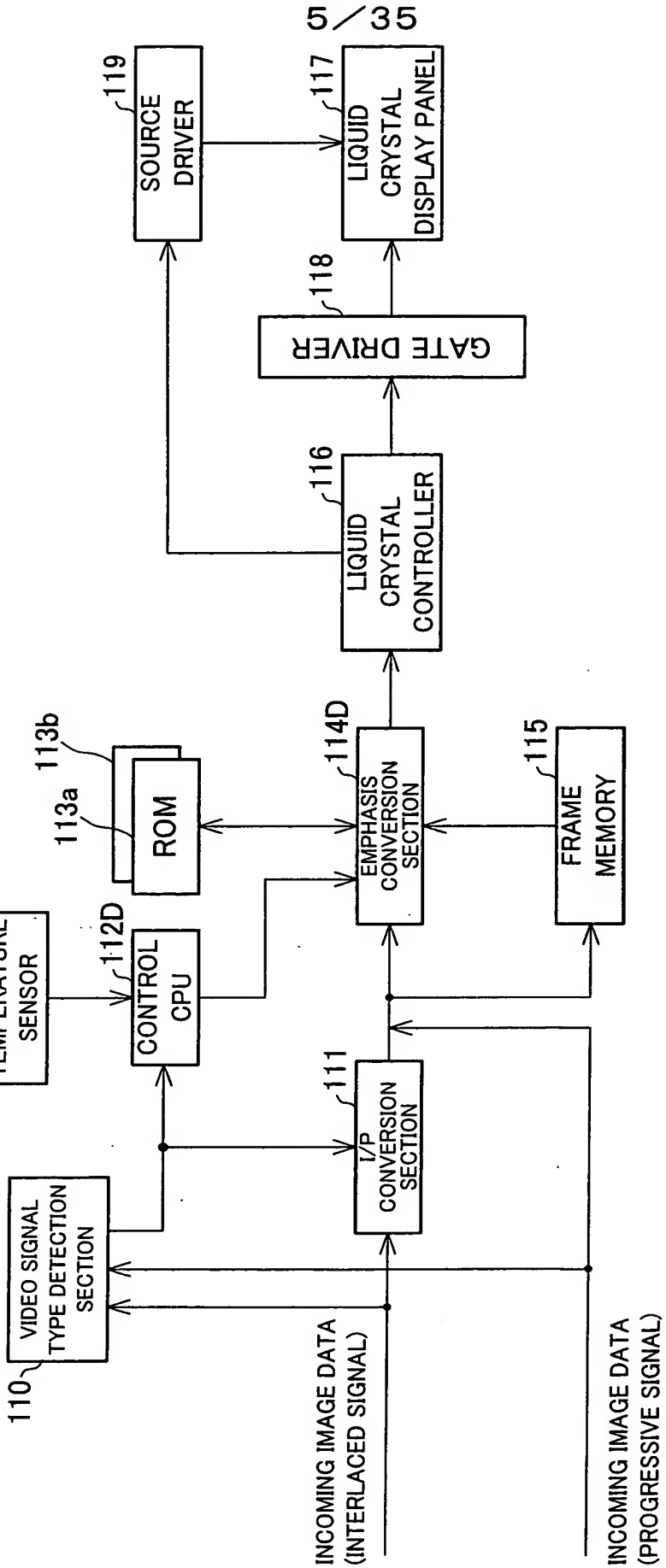

110
VIDEO SIGNAL TYPE DETECTION SECTION
111
I/P CONVERSION SECTION
112D
CONTROL CPU
120
TEMPERATURE SENSOR
113a
113b
ROM
114D
EMPHASIS CONVERSION SECTION
115
FRAME MEMORY
116
LIQUID CRYSTAL CONTROLLER
118
GATE DRIVER
119
SOURCE DRIVER
117
LIQUID CRYSTAL DISPLAY PANEL
INCOMING IMAGE DATA (INTERLACED SIGNAL)
INCOMING IMAGE DATA (PROGRESSIVE SIGNAL)

FIG. 6

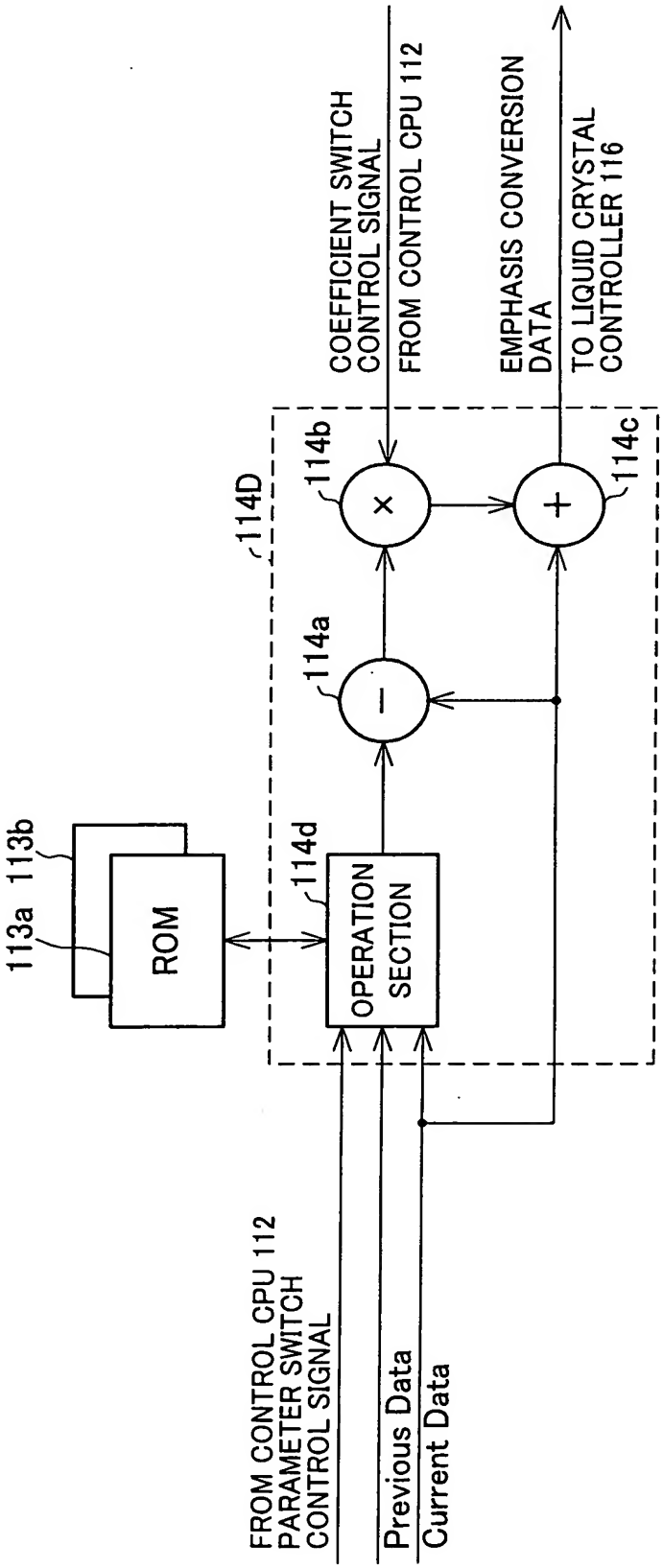

FROM CONTROL CPU 112
PARAMETER SWITCH
CONTROL SIGNAL
Previous Data
Current Data
113a
113b
ROM
114D
114d
OPERATION SECTION
114a
114b
114c
COEFFICIENT SWITCH
CONTROL SIGNAL
FROM CONTROL CPU 112
EMPHASIS CONVERSION
DATA
TO LIQUID CRYSTAL
CONTROLLER 116

FIG. 7

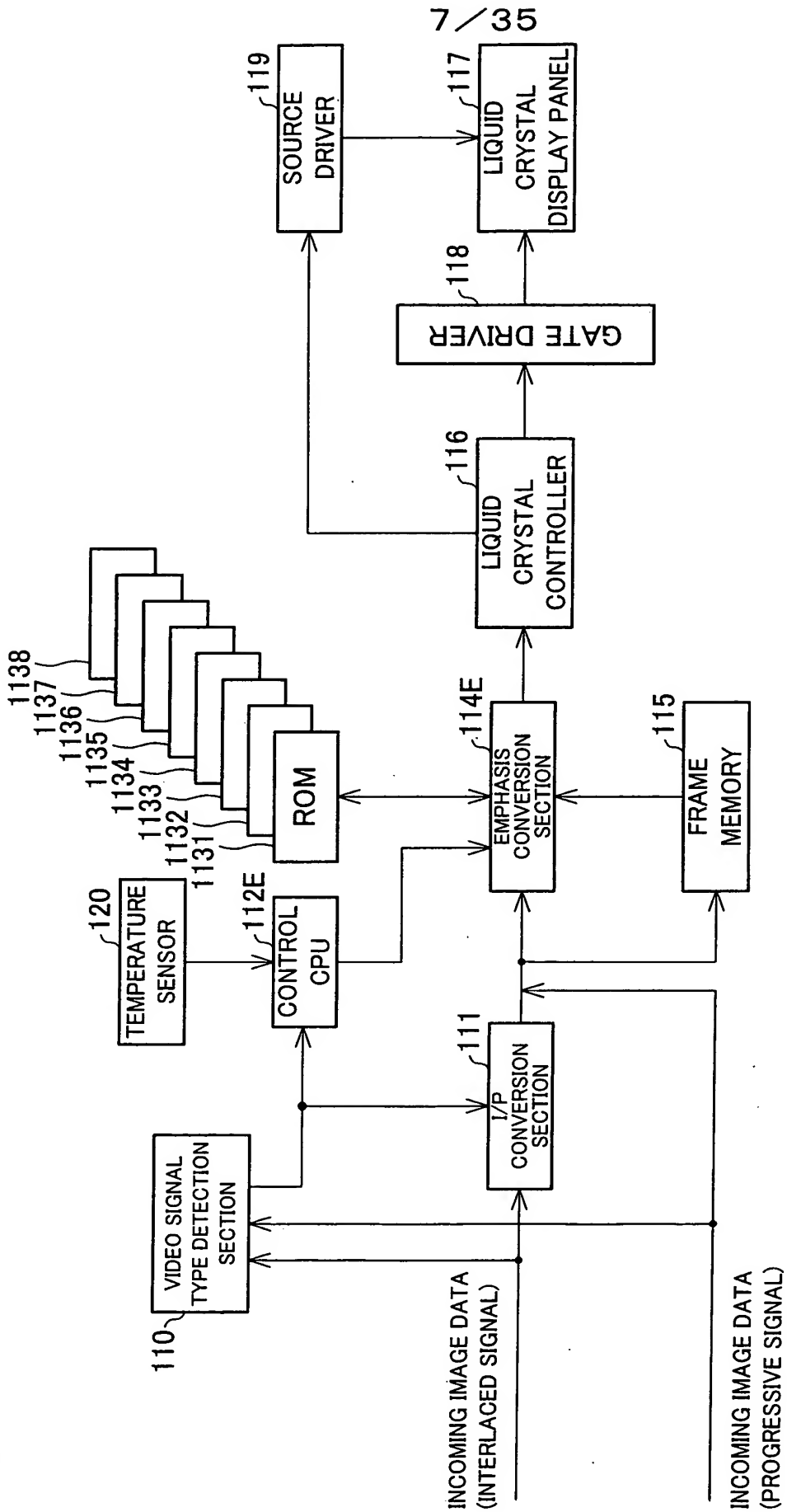

110
VIDEO SIGNAL TYPE DETECTION SECTION
INCOMING IMAGE DATA (INTERLACED SIGNAL)
111
I/P CONVERSION SECTION
INCOMING IMAGE DATA (PROGRESSIVE SIGNAL)
112E
CONTROL CPU
120
TEMPERATURE SENSOR
1131
1132
1133
1134
1135
1136
1137
1138
ROM
114E
EMPHASIS CONVERSION SECTION
115
FRAME MEMORY
116
LIQUID CRYSTAL CONTROLLER
118
GATE DRIVER
119
SOURCE DRIVER
117
LIQUID CRYSTAL DISPLAY PANEL

FIG. 8

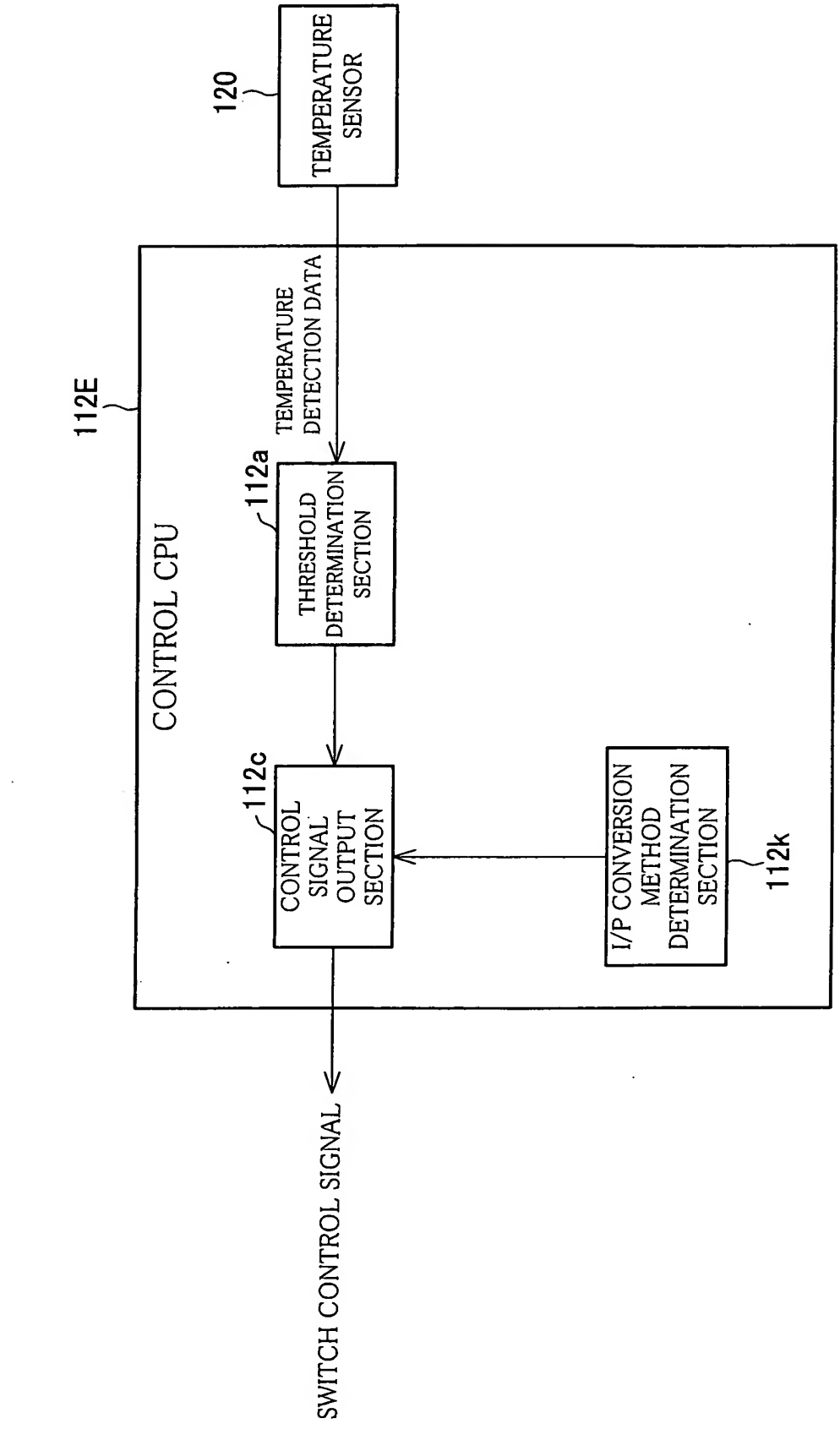

120
TEMPERATURE SENSOR
TEMPERATURE DETECTION DATA
112E
CONTROL CPU
112a
THRESHOLD DETERMINATION SECTION
112c
CONTROL SIGNAL OUTPUT SECTION
I/P CONVERSION METHOD DETERMINATION SECTION
112k
SWITCH CONTROL SIGNAL

FIG. 9

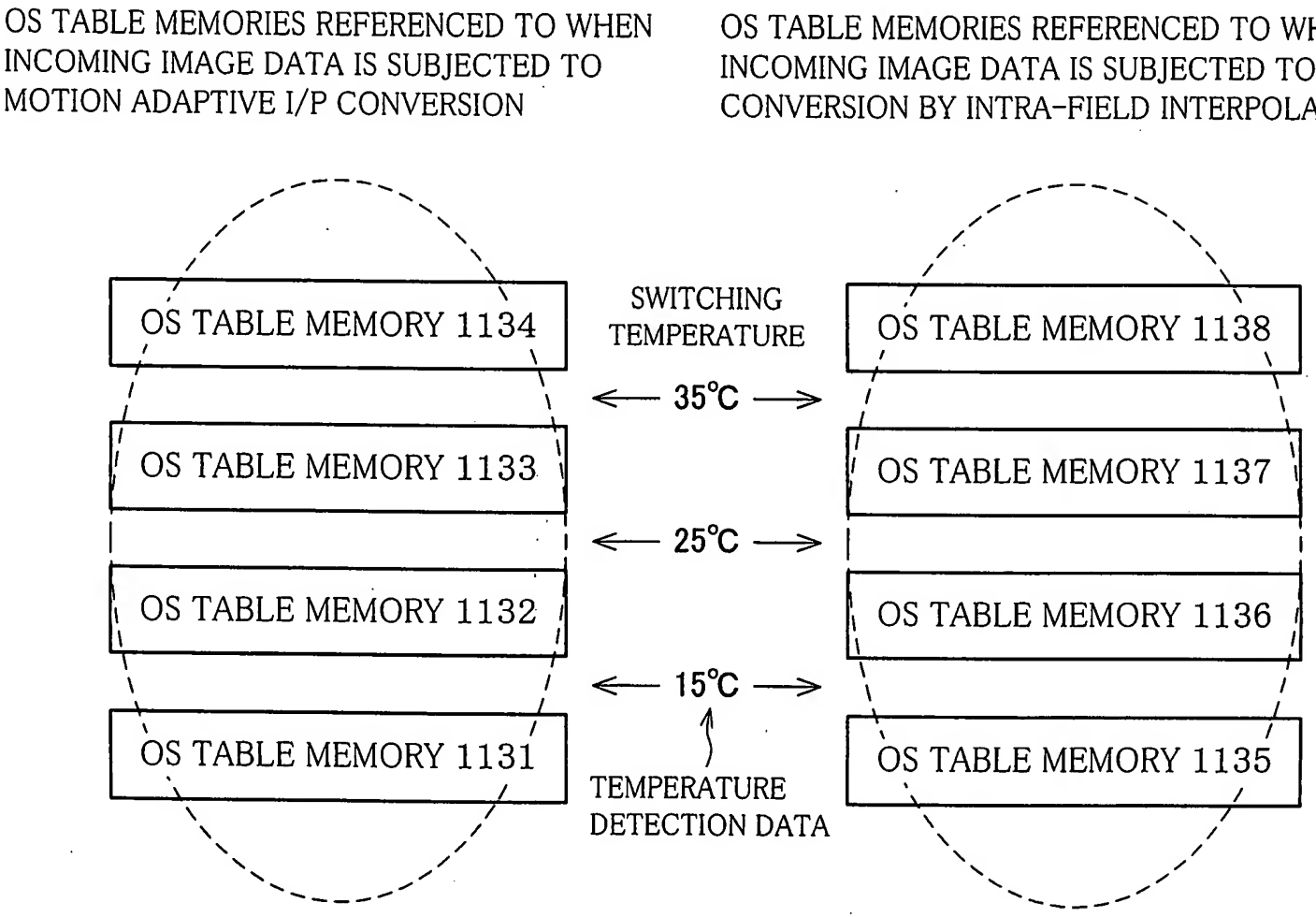

OS TABLE MEMORIES REFERENCED TO WHEN INCOMING IMAGE DATA IS SUBJECTED TO MOTION ADAPTIVE I/P CONVERSION
OS TABLE MEMORIES REFERENCED TO WHEN INCOMING IMAGE DATA IS SUBJECTED TO CONVERSION BY INTRA-FIELD INTERPOLATION ONLY
OS TABLE MEMORY 1134
OS TABLE MEMORY 1133
OS TABLE MEMORY 1132
OS TABLE MEMORY 1131
SWITCHING TEMPERATURE
35°C
25°C
15°C
TEMPERATURE DETECTION DATA
OS TABLE MEMORY 1138
OS TABLE MEMORY 1137
OS TABLE MEMORY 1136
OS TABLE MEMORY 1135

FIG. 10

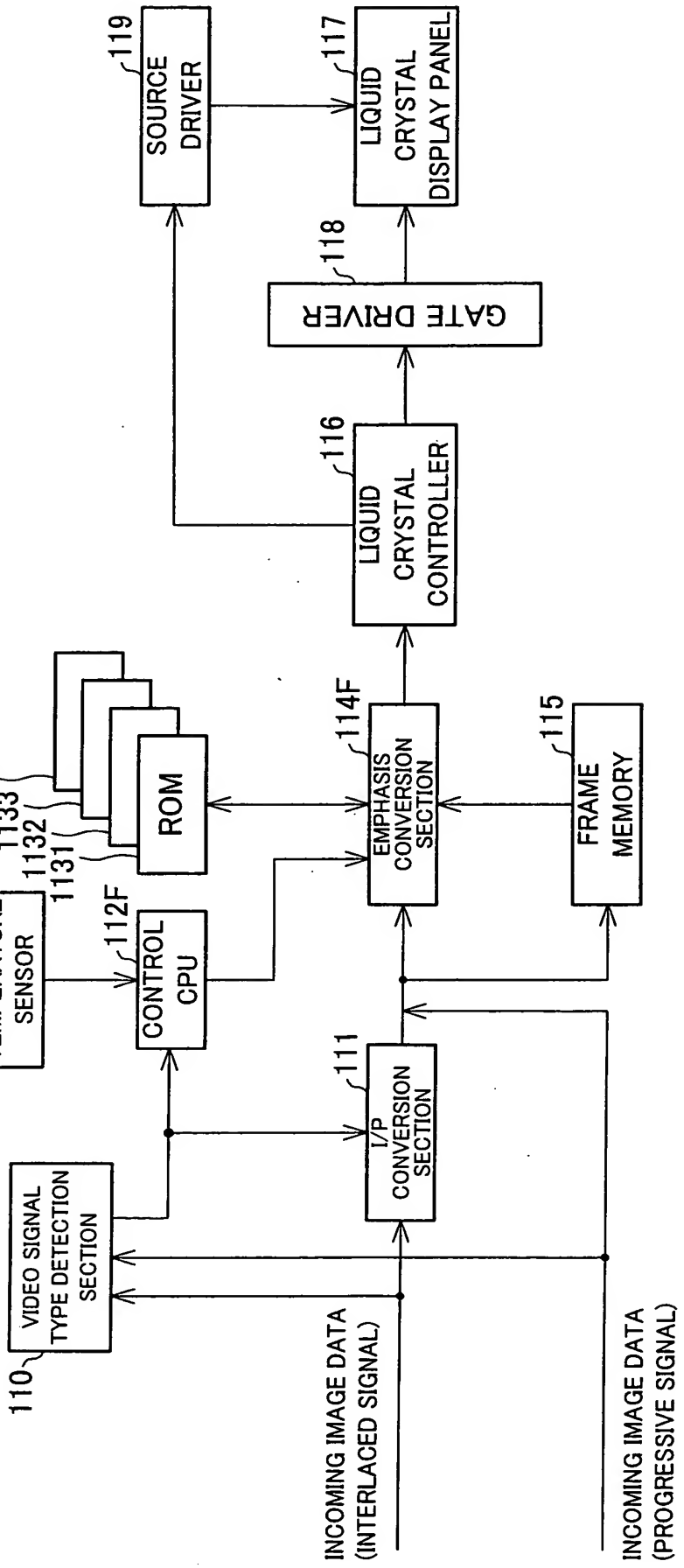

110
VIDEO SIGNAL TYPE DETECTION SECTION
INCOMING IMAGE DATA (INTERLACED SIGNAL)
111
I/P CONVERSION SECTION
INCOMING IMAGE DATA (PROGRESSIVE SIGNAL)
112F
CONTROL CPU
120
TEMPERATURE SENSOR
1131
1132
1133
1134
ROM
114F
EMPHASIS CONVERSION SECTION
115
FRAME MEMORY
116
LIQUID CRYSTAL CONTROLLER
118
GATE DRIVER
119
SOURCE DRIVER
117
LIQUID CRYSTAL DISPLAY PANEL

FIG. 11

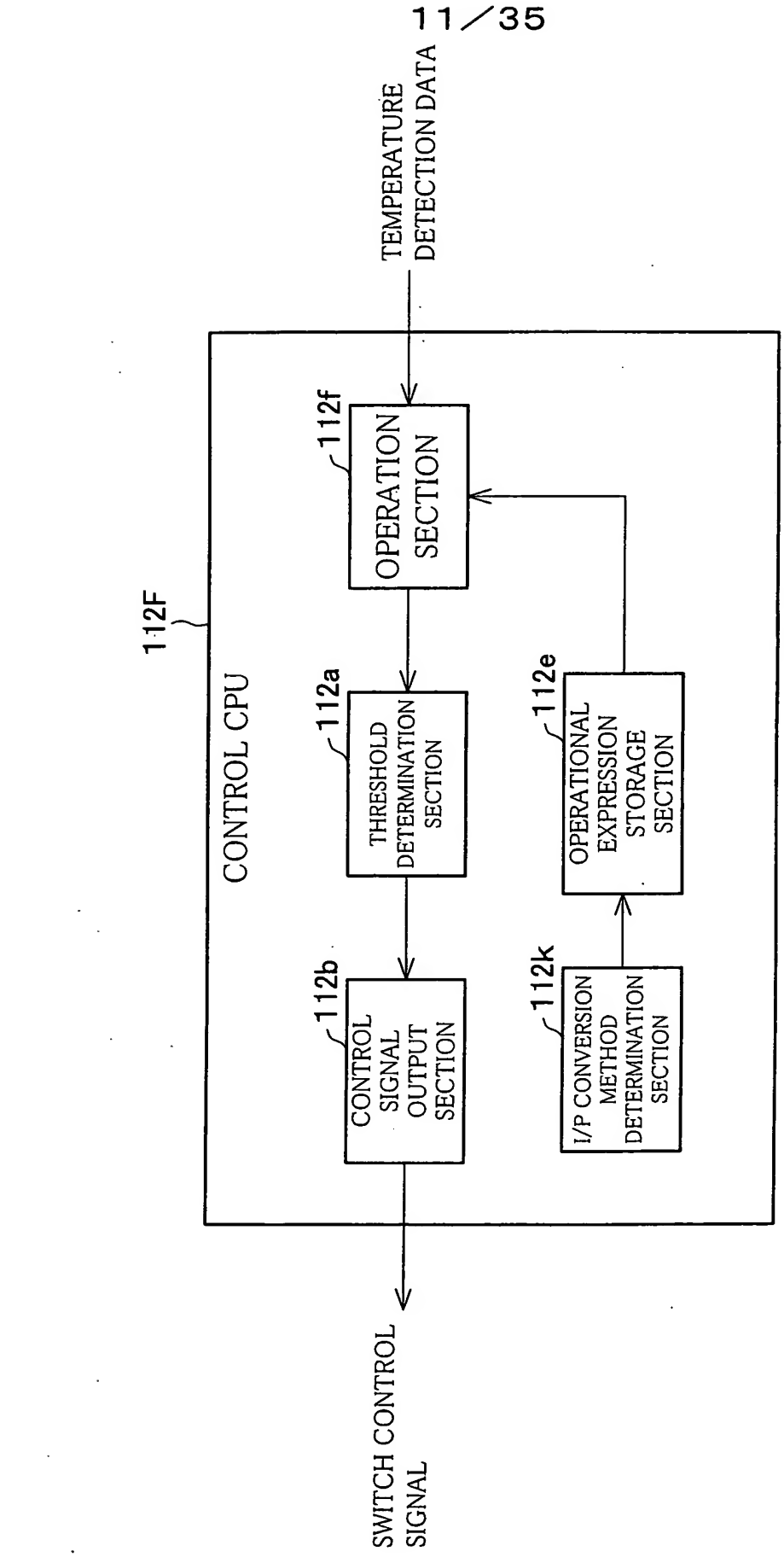

TEMPERATURE DETECTION DATA
112F
CONTROL CPU
112f
OPERATION SECTION
112a
THRESHOLD DETERMINATION SECTION
112e
OPERATIONAL EXPRESSION STORAGE SECTION
112b
CONTROL SIGNAL OUTPUT SECTION
112k
I/P CONVERSION METHOD DETERMINATION SECTION
SWITCH CONTROL SIGNAL

FIG. 12

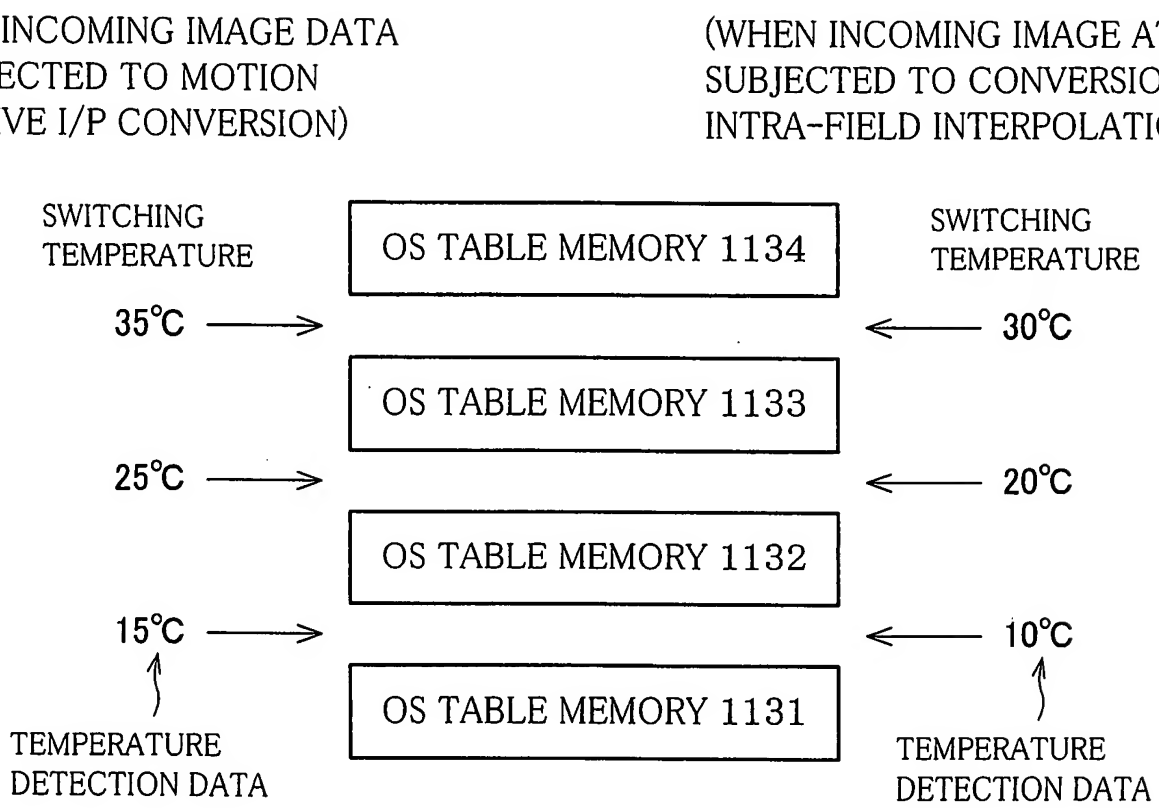

(WHEN INCOMING IMAGE DATA IS SUBJECTED TO MOTION ADAPTIVE I/P CONVERSION)
(WHEN INCOMING IMAGE ATA IS SUBJECTED TO CONVERSION BY INTRA-FIELD INTERPOLATION ONLY)
SWITCHING TEMPERATURE
SWITCHING TEMPERATURE
OS TABLE MEMORY 1134
OS TABLE MEMORY 1133
OS TABLE MEMORY 1132
OS TABLE MEMORY 1131
35℃
30℃
25℃
20℃
15℃
10℃
TEMPERATURE DETECTION DATA
TEMPERATURE DETECTION DATA

FIG. 13

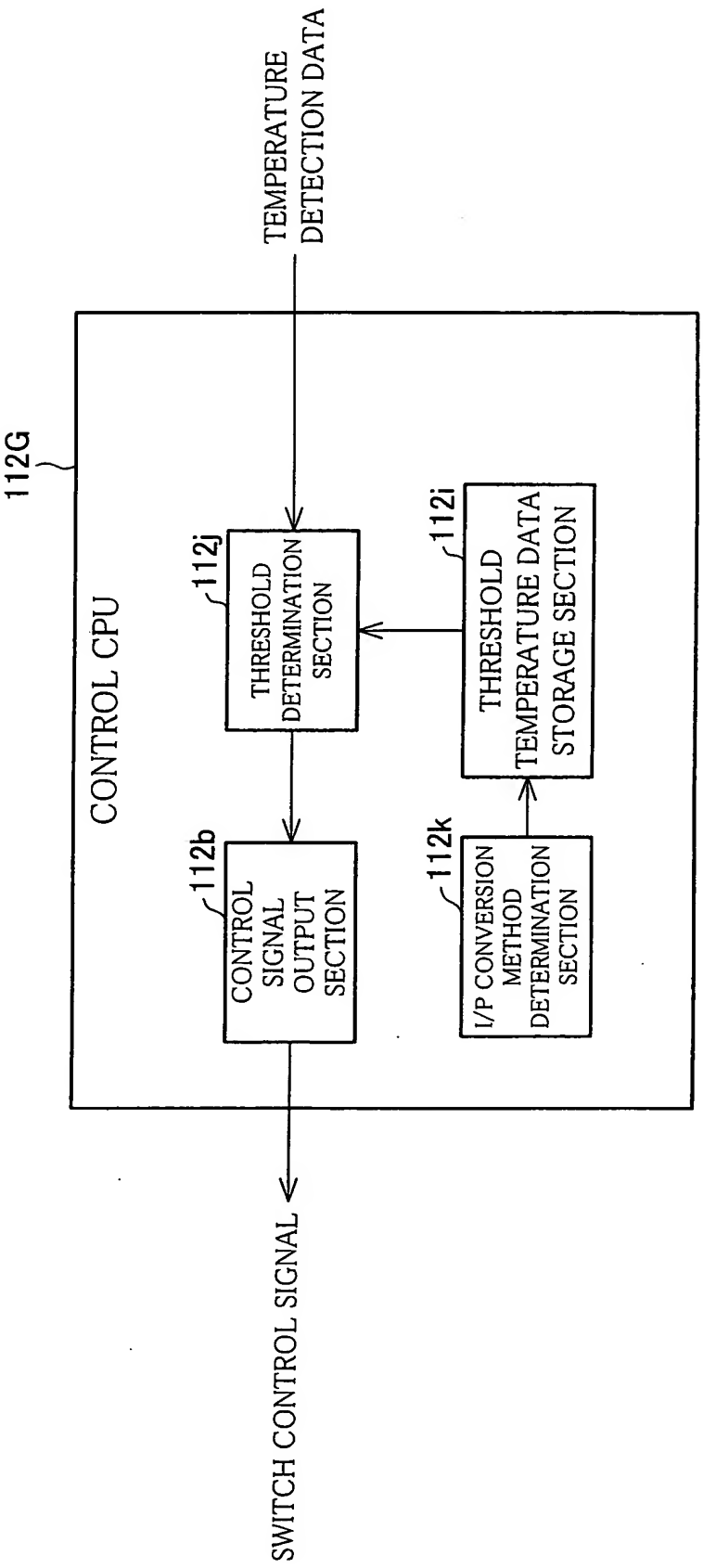

TEMPERATURE DETECTION DATA
112G
CONTROL CPU
112j
THRESHOLD DETERMINATION SECTION
112i
THRESHOLD TEMPERATURE DATA STORAGE SECTION
112b
CONTROL SIGNAL OUTPUT SECTION
112k
I/P CONVERSION METHOD DETERMINATION SECTION
SWITCH CONTROL SIGNAL

FIG. 14

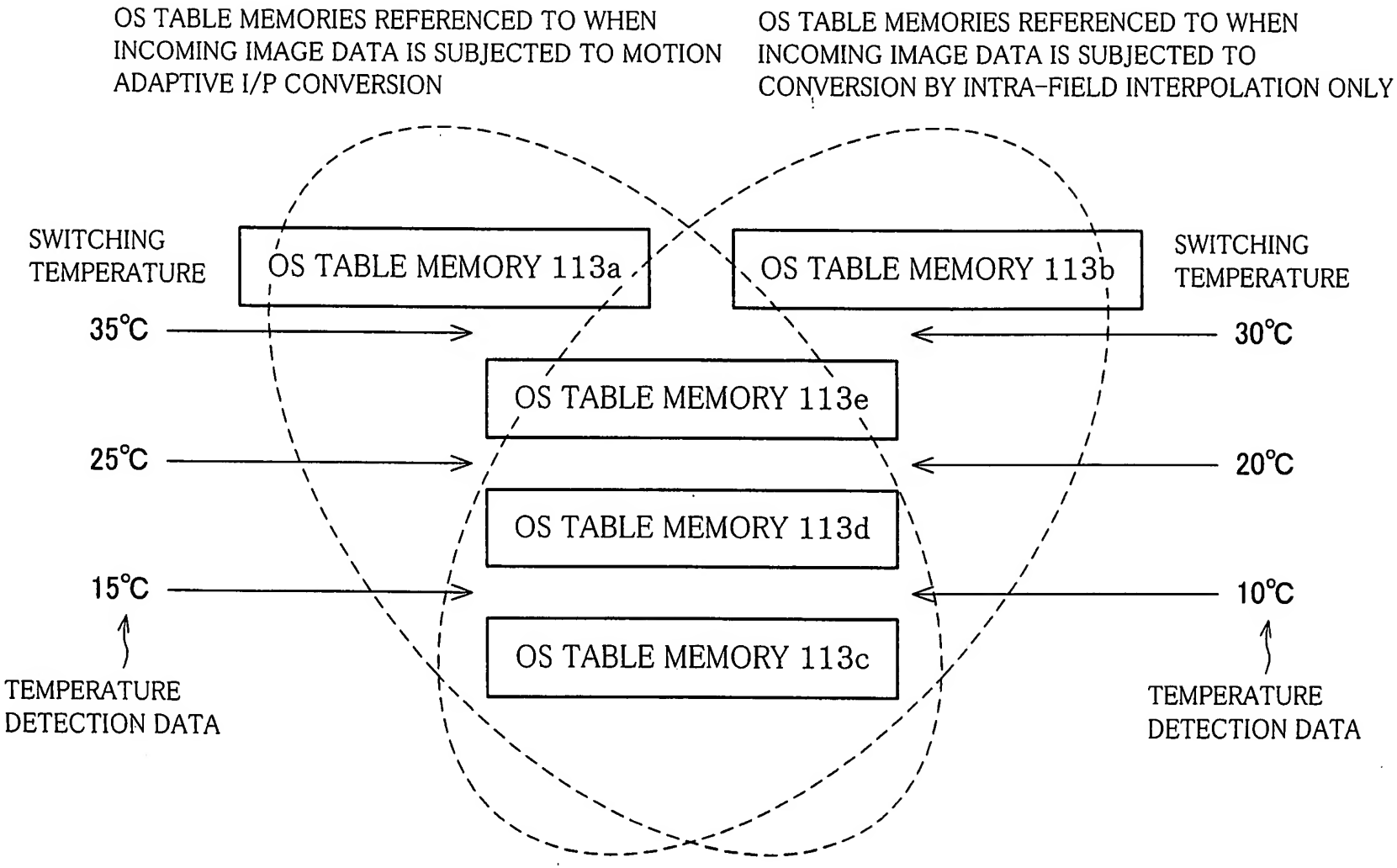

OS TABLE MEMORIES REFERENCED TO WHEN INCOMING IMAGE DATA IS SUBJECTED TO MOTION ADAPTIVE I/P CONVERSION
OS TABLE MEMORIES REFERENCED TO WHEN INCOMING IMAGE DATA IS SUBJECTED TO CONVERSION BY INTRA-FIELD INTERPOLATION ONLY
SWITCHING TEMPERATURE
OS TABLE MEMORY 113a
OS TABLE MEMORY 113b
SWITCHING TEMPERATURE
35℃
30℃
OS TABLE MEMORY 113e
25℃
20℃
OS TABLE MEMORY 113d
15℃
10℃
OS TABLE MEMORY 113c
TEMPERATURE DETECTION DATA
TEMPERATURE DETECTION DATA

FIG. 15

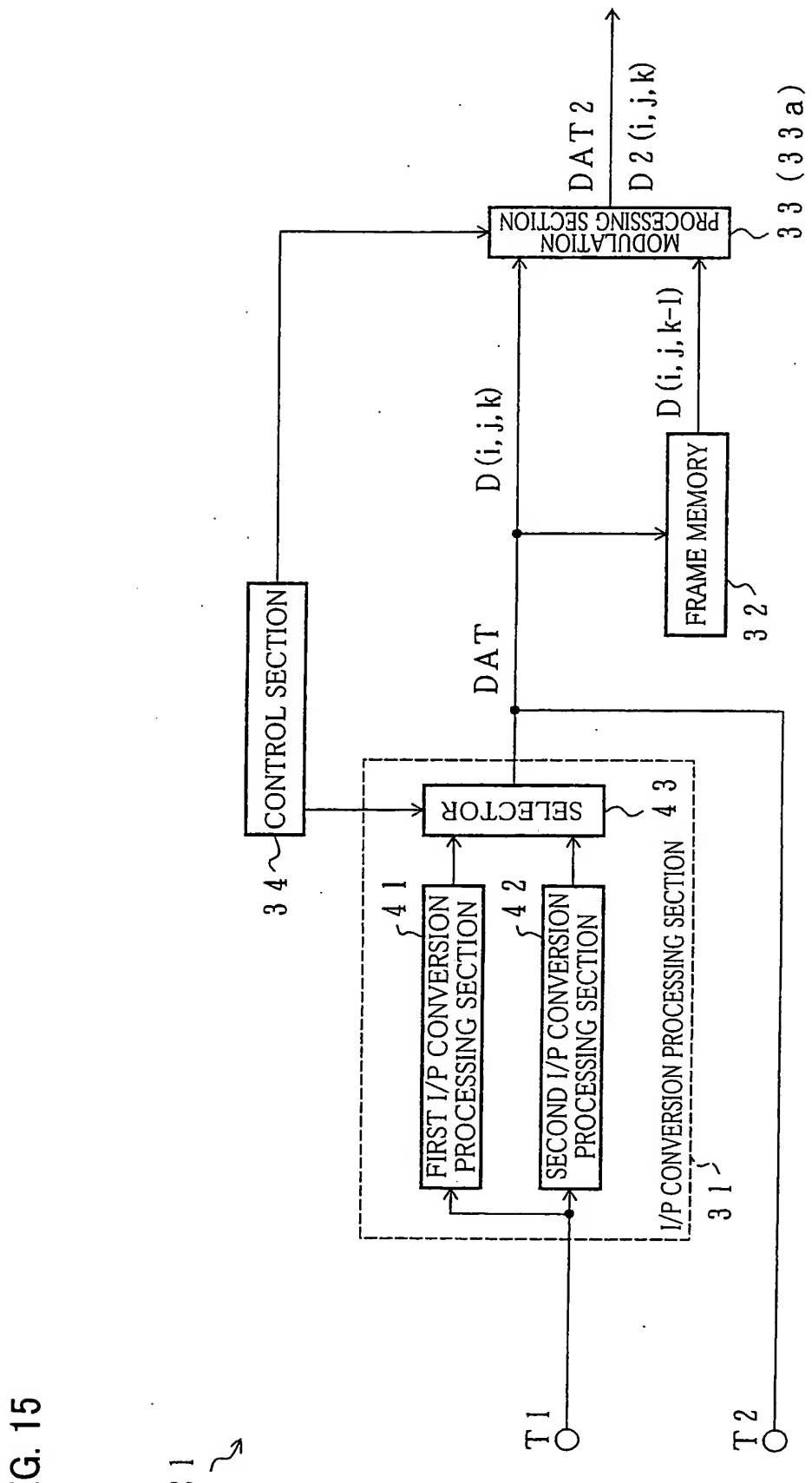

21
T1
T2
I/P CONVERSION PROCESSING SECTION
31
FIRST I/P CONVERSION PROCESSING SECTION
41
SECOND I/P CONVERSION PROCESSING SECTION
42
SELECTOR
43
CONTROL SECTION
34
DAT
D(i, j, k)
FRAME MEMORY
32
D(i, j, k-1)
MODULATION PROCESSING SECTION
33 (33a)
DAT2
D2(i, j, k)

FIG. 16

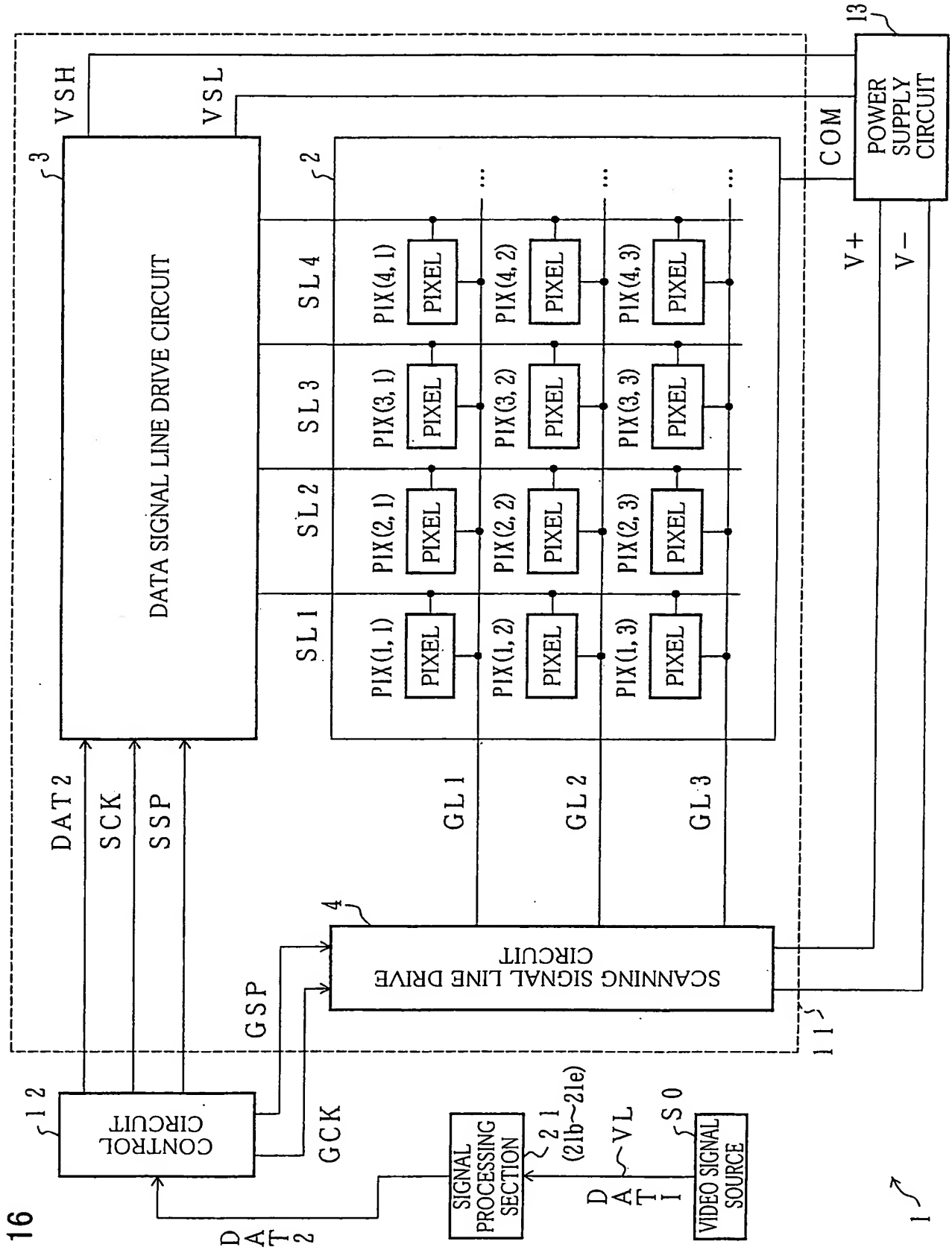

1
11
12
CONTROL CIRCUIT
13
POWER SUPPLY CIRCUIT
2
3
DATA SIGNAL LINE DRIVE CIRCUIT
4
SCANNING SIGNAL LINE DRIVE CIRCUIT
21
SIGNAL PROCESSING SECTION
(21b~21e)
VIDEO SIGNAL SOURCE
VSH
VSL
COM
V+
V−
DAT2
SCK
SSP
GSP
GCK
DAT2
DATI
VL
S0
SL1
SL2
SL3
SL4
GL1
GL2
GL3
PIX(1,1)
PIX(1,2)
PIX(1,3)
PIX(2,1)
PIX(2,2)
PIX(2,3)
PIX(3,1)
PIX(3,2)
PIX(3,3)
PIX(4,1)
PIX(4,2)
PIX(4,3)
PIXEL

FIG. 17

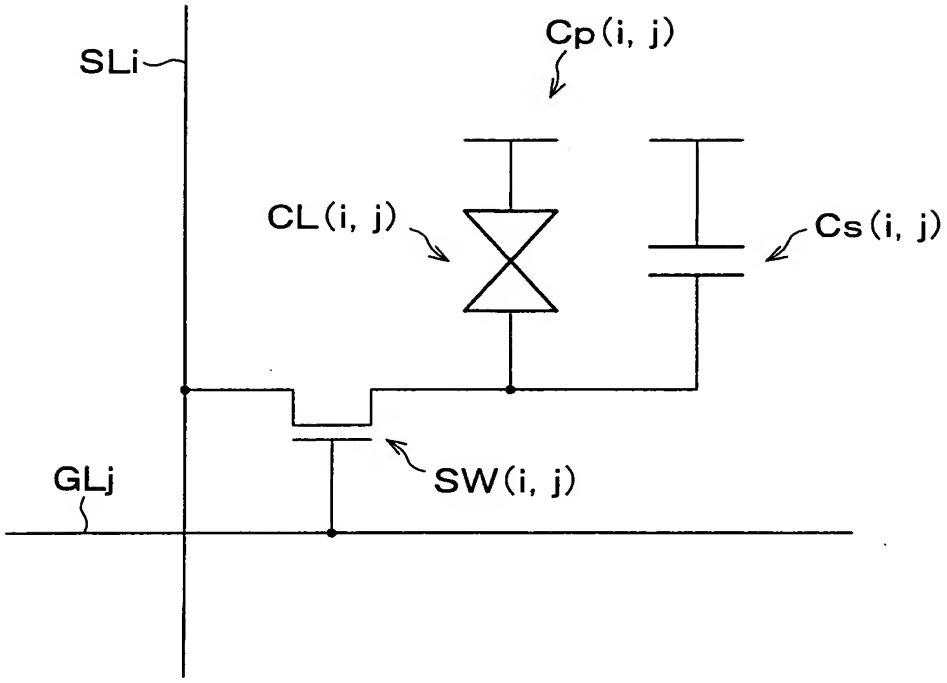
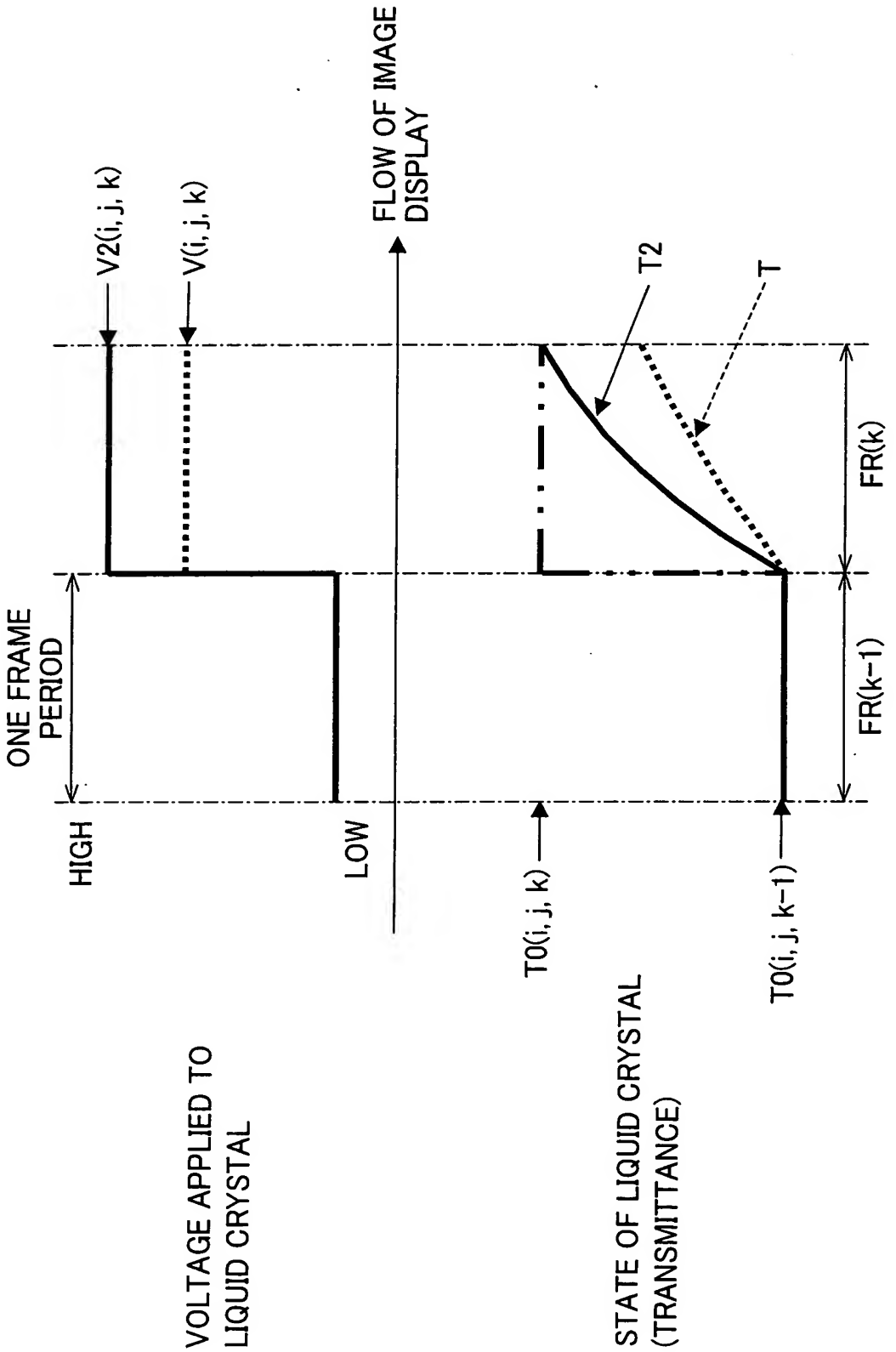


FIG. 18


FLOW OF IMAGE DISPLAY
V2(i, j, k)
V(i, j, k)
T2
T
ONE FRAME PERIOD
FR(k)
FR(k-1)
HIGH
LOW
T0(i, j, k)
T0(i, j, k-1)
VOLTAGE APPLIED TO LIQUID CRYSTAL
STATE OF LIQUID CRYSTAL (TRANSMITTANCE)

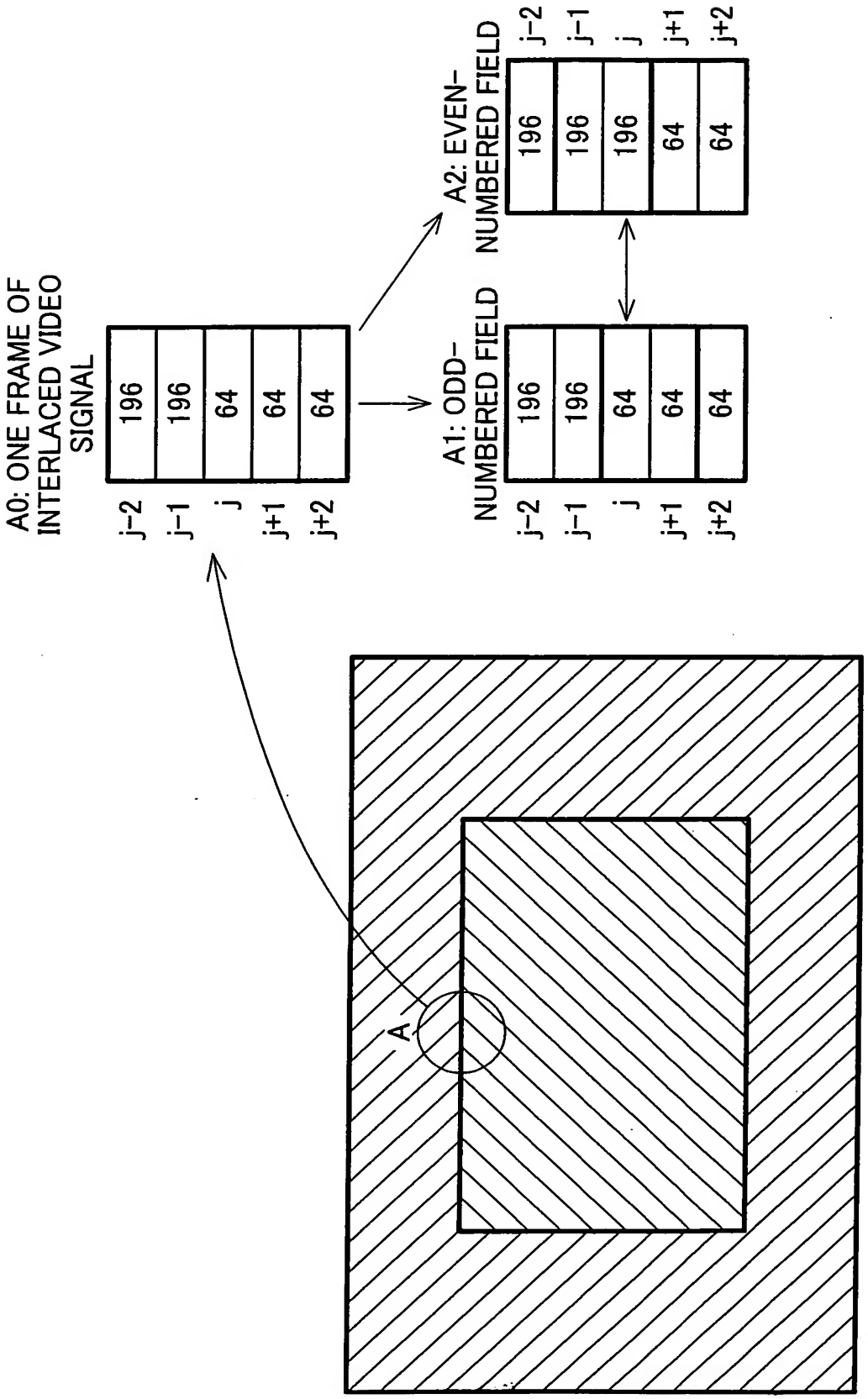

A0: ONE FRAME OF INTERLACED VIDEO SIGNAL
196
196
64
64
64
j-2
j-1
j
j+1
j+2
A1: ODD-NUMBERED FIELD
196
196
64
64
64
j-2
j-1
j
j+1
j+2
A2: EVEN-NUMBERED FIELD
196
196
196
64
64
j-2
j-1
j
j+1
j+2
A

FIG. 19

FIG. 20

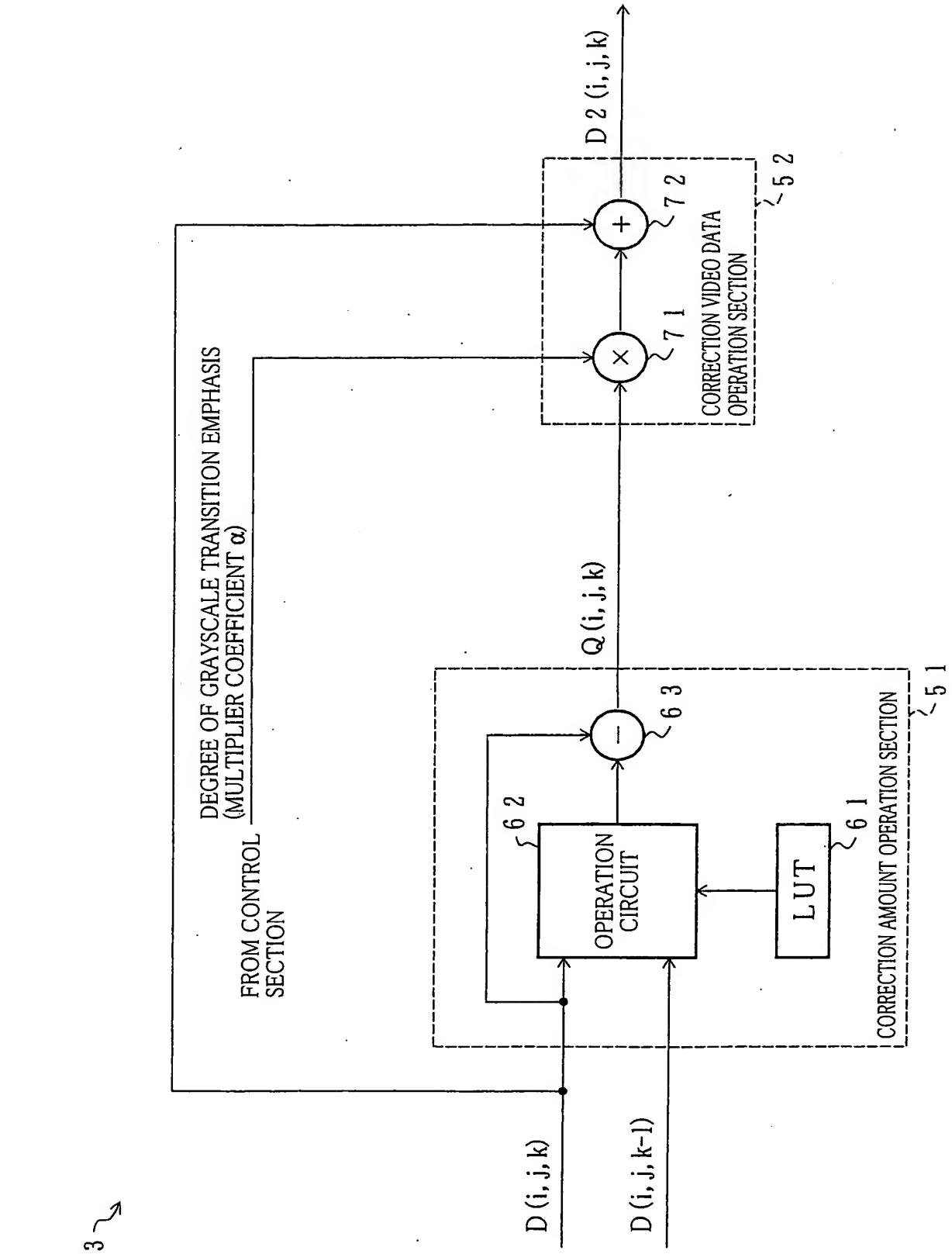

33
D (i, j, k)
D (i, j, k-1)
FROM CONTROL SECTION
DEGREE OF GRAYSCALE TRANSITION EMPHASIS (MULTIPLIER COEFFICIENT α)
CORRECTION AMOUNT OPERATION SECTION
51
LUT
61
OPERATION CIRCUIT
62
63
Q (i, j, k)
CORRECTION VIDEO DATA OPERATION SECTION
52
71
72
D 2 (i, j, k)

FIG. 21

VIDEO DATA OF CURRENT FRAME

VIDEO DATA OF PREVIOUS FRAME

\	0	32	64	96	128	160	192	224	255
0	0	51	118	165	194	214	230	242	255
32	0	32	120	159	183	206	226	240	255
64	0	12	64	110	150	182	209	234	255
96	0	0	48	96	140	175	204	232	255
128	0	0	43	81	128	167	201	232	255
160	0	0	35	66	117	160	196	229	255
192	0	0	2	56	105	152	192	227	255
224	0	0	0	50	85	139	186	224	255
255	0	0	0	44	75	136	181	215	255

FIG. 22

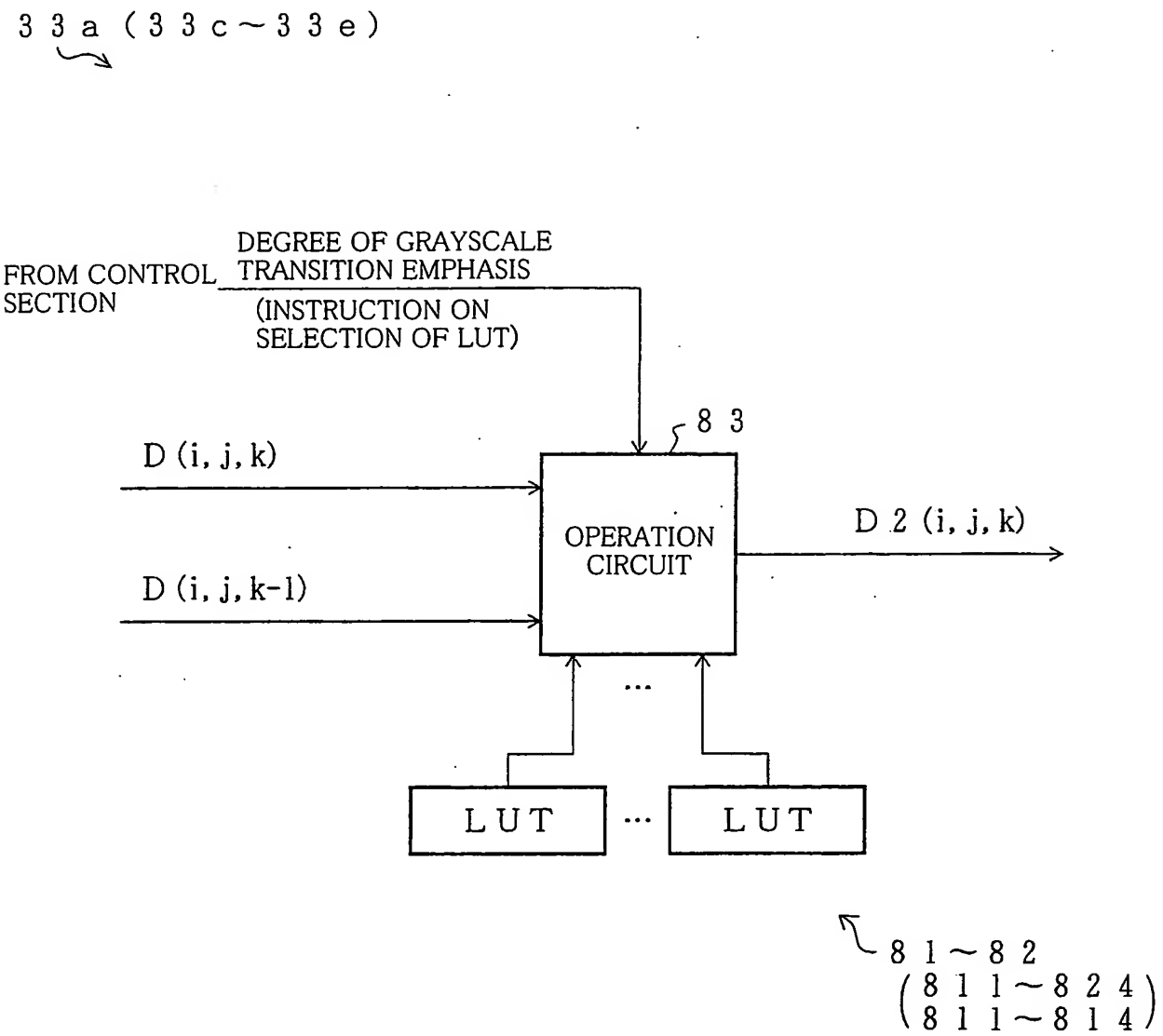

33a (33c～33e)
FROM CONTROL SECTION
DEGREE OF GRAYSCALE TRANSITION EMPHASIS (INSTRUCTION ON SELECTION OF LUT)
83
D (i, j, k)
D (i, j, k-1)
OPERATION CIRCUIT
D 2 (i, j, k)
LUT
LUT
81～82
(811～824)
(811～814)

FIG. 23

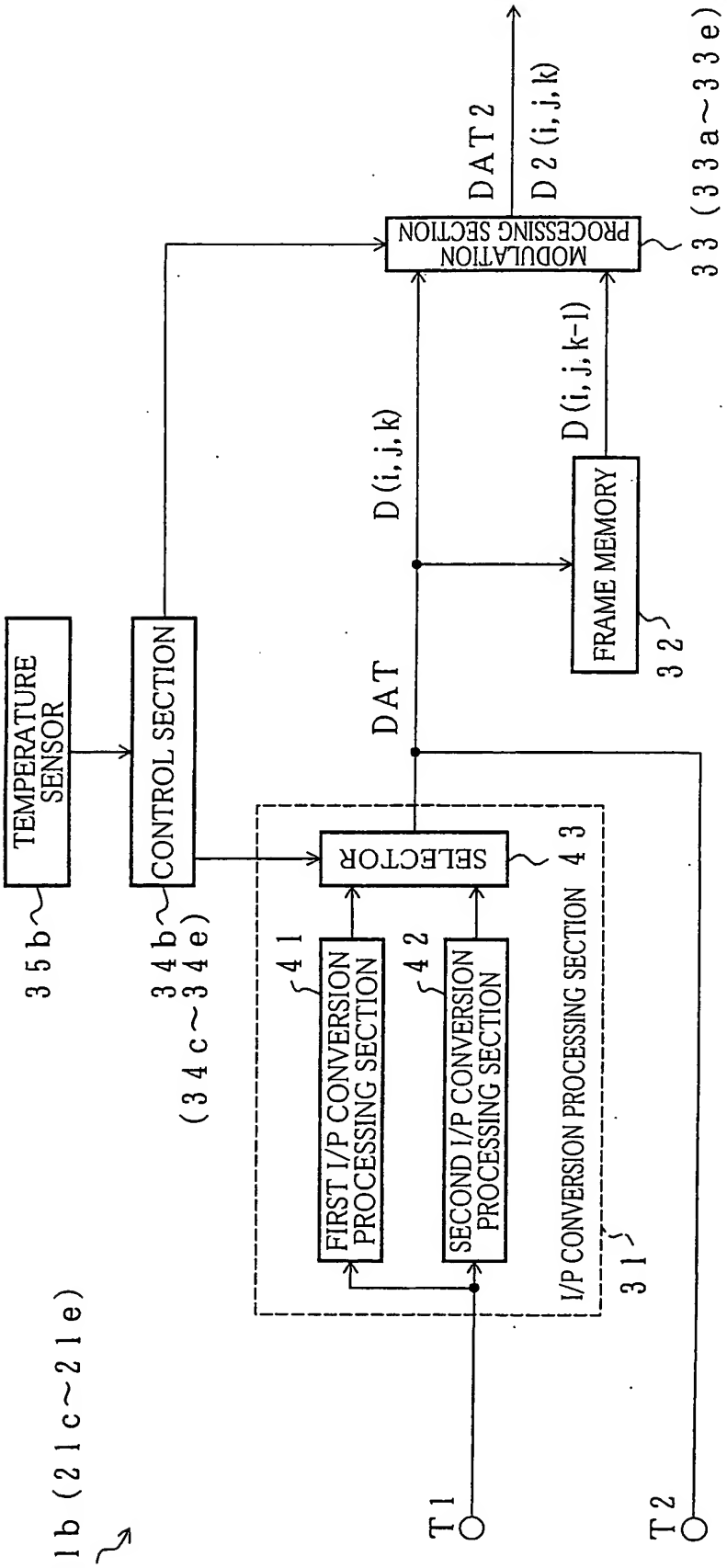

21b (21c~21e)
T1
T2
I/P CONVERSION PROCESSING SECTION 43
31
41
FIRST I/P CONVERSION PROCESSING SECTION
42
SECOND I/P CONVERSION PROCESSING SECTION
SELECTOR
DAT
D(i,j,k)
D(i,j,k-1)
FRAME MEMORY
32
MODULATION PROCESSING SECTION
33 (33a~33e)
DAT2
D2(i,j,k)
TEMPERATURE SENSOR
35b
CONTROL SECTION
34b (34c~34e)

FIG. 24

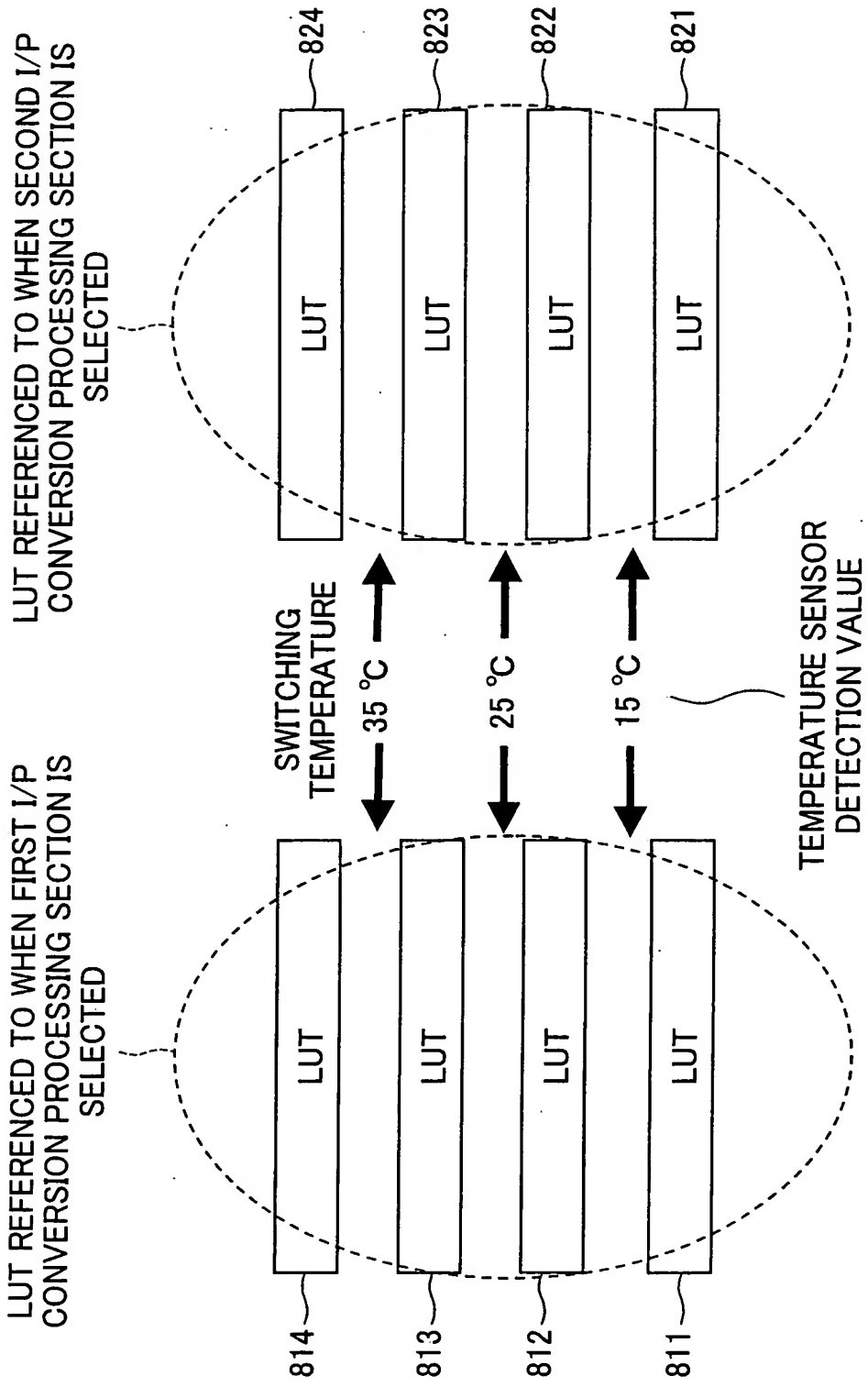

LUT REFERENCED TO WHEN SECOND I/P CONVERSION PROCESSING SECTION IS SELECTED
LUT REFERENCED TO WHEN FIRST I/P CONVERSION PROCESSING SECTION IS SELECTED
SWITCHING TEMPERATURE
35 °C
25 °C
15 °C
TEMPERATURE SENSOR DETECTION VALUE
LUT
824
823
822
821
814
813
812
811

FIG. 25

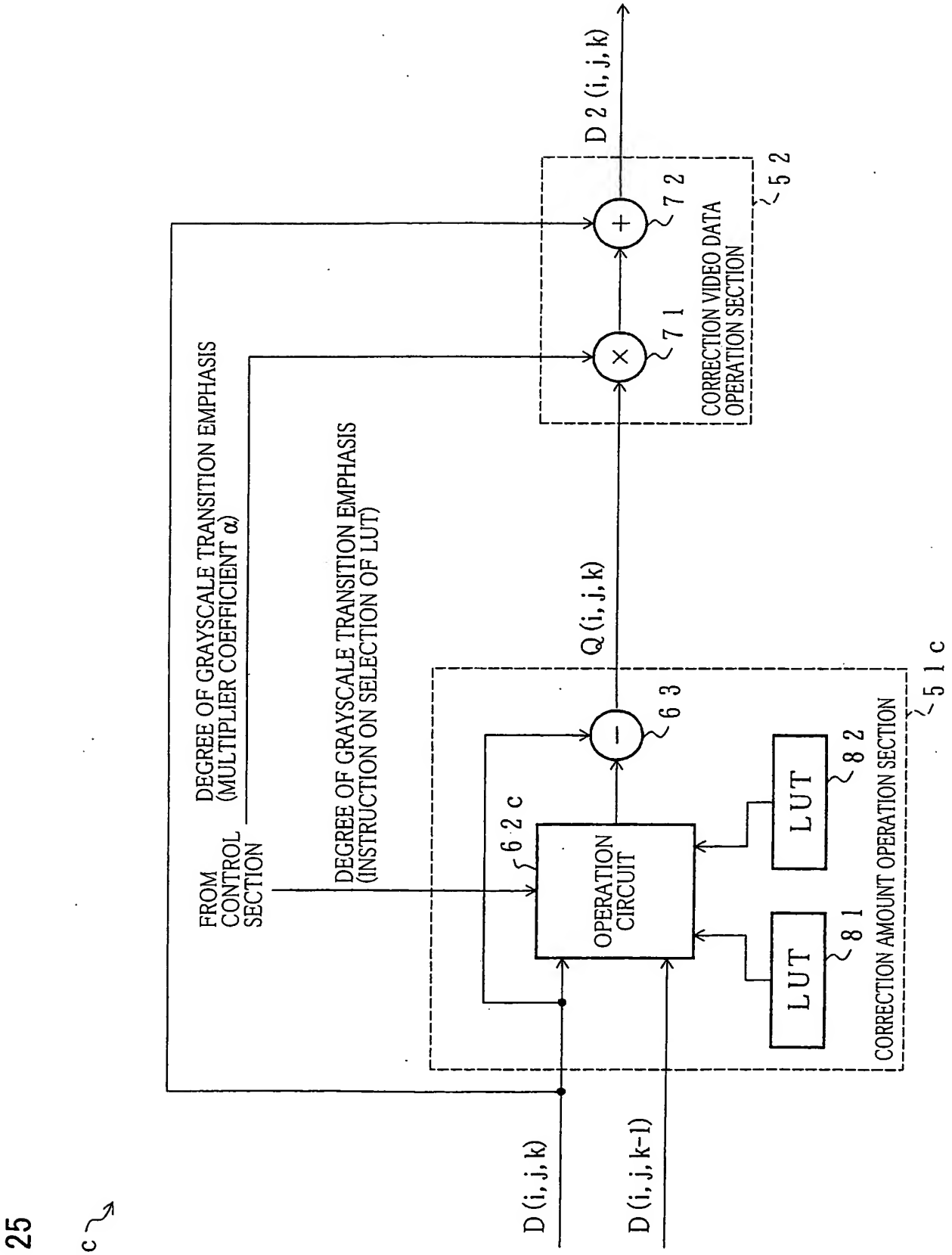

33c
FROM CONTROL SECTION
DEGREE OF GRAYSCALE TRANSITION EMPHASIS (MULTIPLIER COEFFICIENT α)
DEGREE OF GRAYSCALE TRANSITION EMPHASIS (INSTRUCTION ON SELECTION OF LUT)
D(i, j, k)
D(i, j, k-1)
OPERATION CIRCUIT
62c
LUT
81
LUT
82
63
Q(i, j, k)
71
72
D2(i, j, k)
CORRECTION VIDEO DATA OPERATION SECTION
52
CORRECTION AMOUNT OPERATION SECTION
51c

FIG. 26

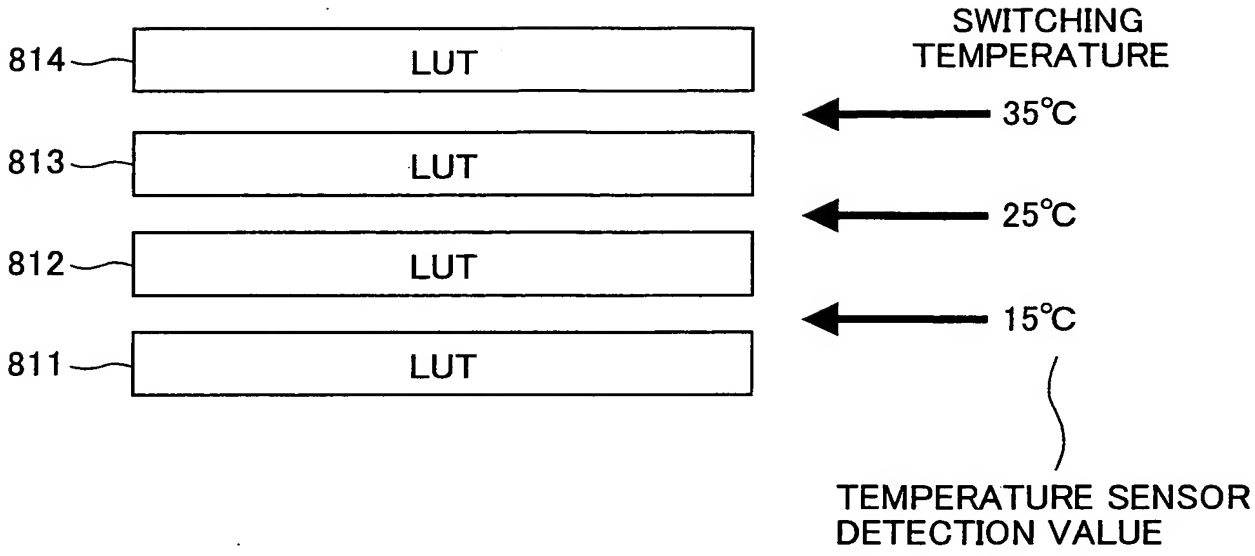

814
LUT
813
LUT
812
LUT
811
LUT
SWITCHING TEMPERATURE
35℃
25℃
15℃
TEMPERATURE SENSOR DETECTION VALUE

FIG. 27

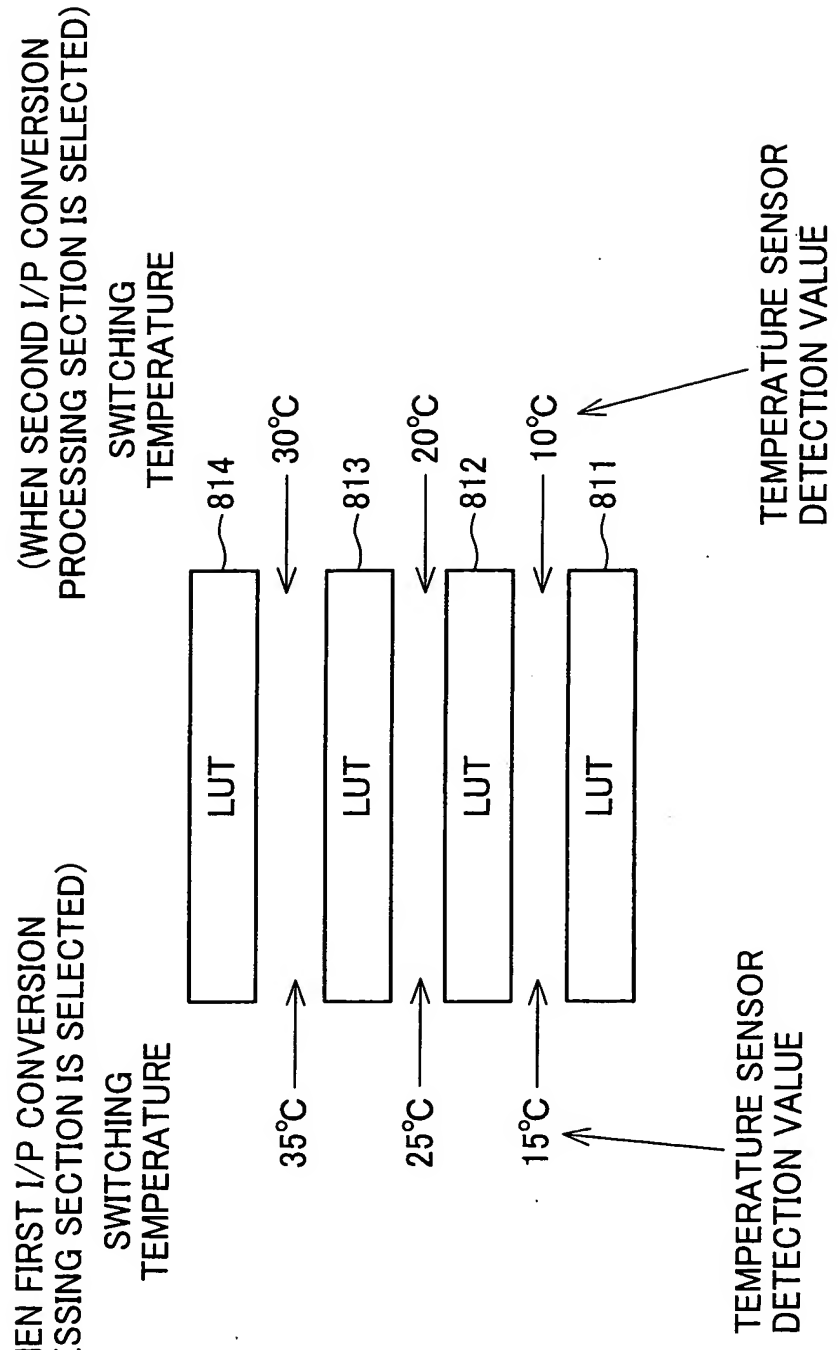

(WHEN FIRST I/P CONVERSION PROCESSING SECTION IS SELECTED)
SWITCHING TEMPERATURE
(WHEN SECOND I/P CONVERSION PROCESSING SECTION IS SELECTED)
SWITCHING TEMPERATURE
814
813
812
811
LUT
LUT
LUT
LUT
35°C
25°C
15°C
30°C
20°C
10°C
TEMPERATURE SENSOR DETECTION VALUE
TEMPERATURE SENSOR DETECTION VALUE

FIG. 28

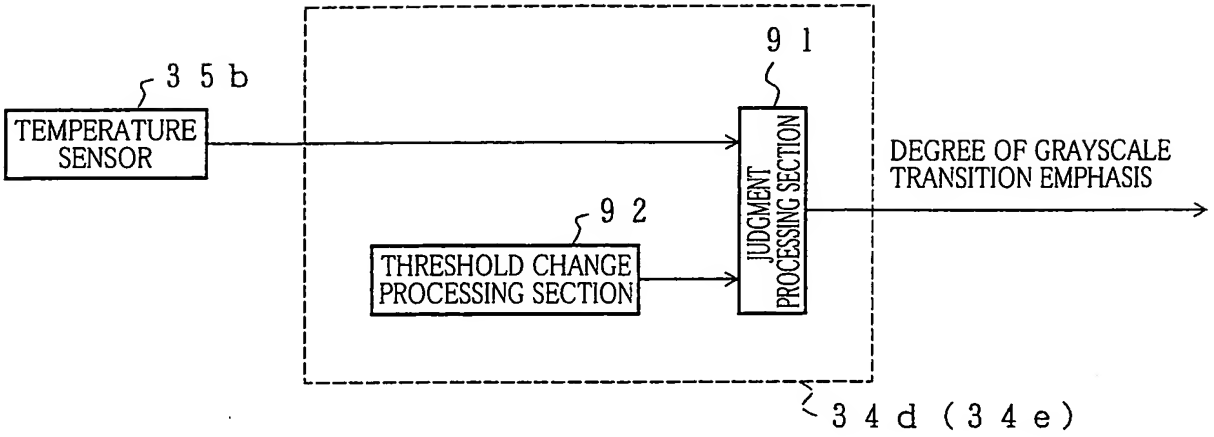

91
35b
TEMPERATURE SENSOR
92
THRESHOLD CHANGE PROCESSING SECTION
JUDGMENT PROCESSING SECTION
DEGREE OF GRAYSCALE TRANSITION EMPHASIS
34d (34e)

FIG. 29

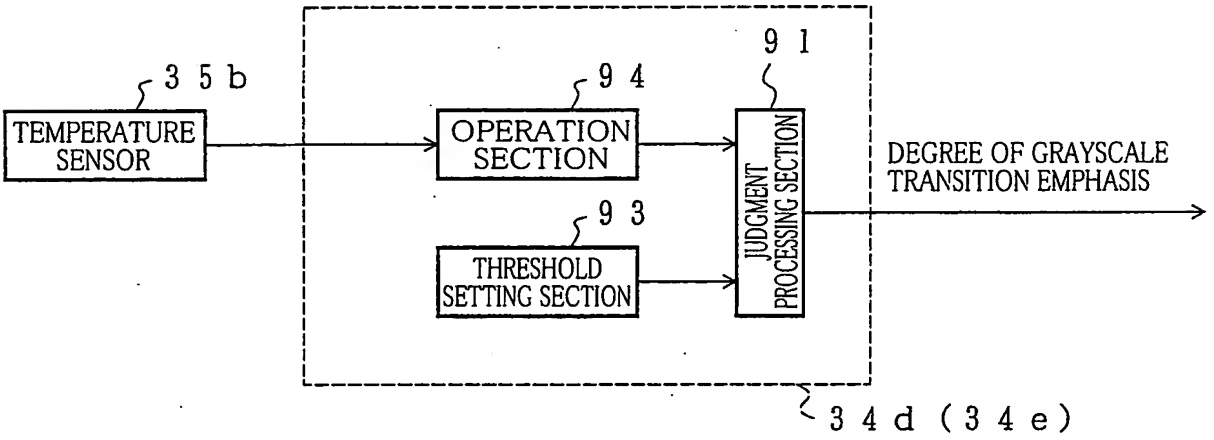

91
35b
TEMPERATURE SENSOR
94
OPERATION SECTION
93
THRESHOLD SETTING SECTION
JUDGMENT PROCESSING SECTION
DEGREE OF GRAYSCALE TRANSITION EMPHASIS
34d (34e)

FIG. 30

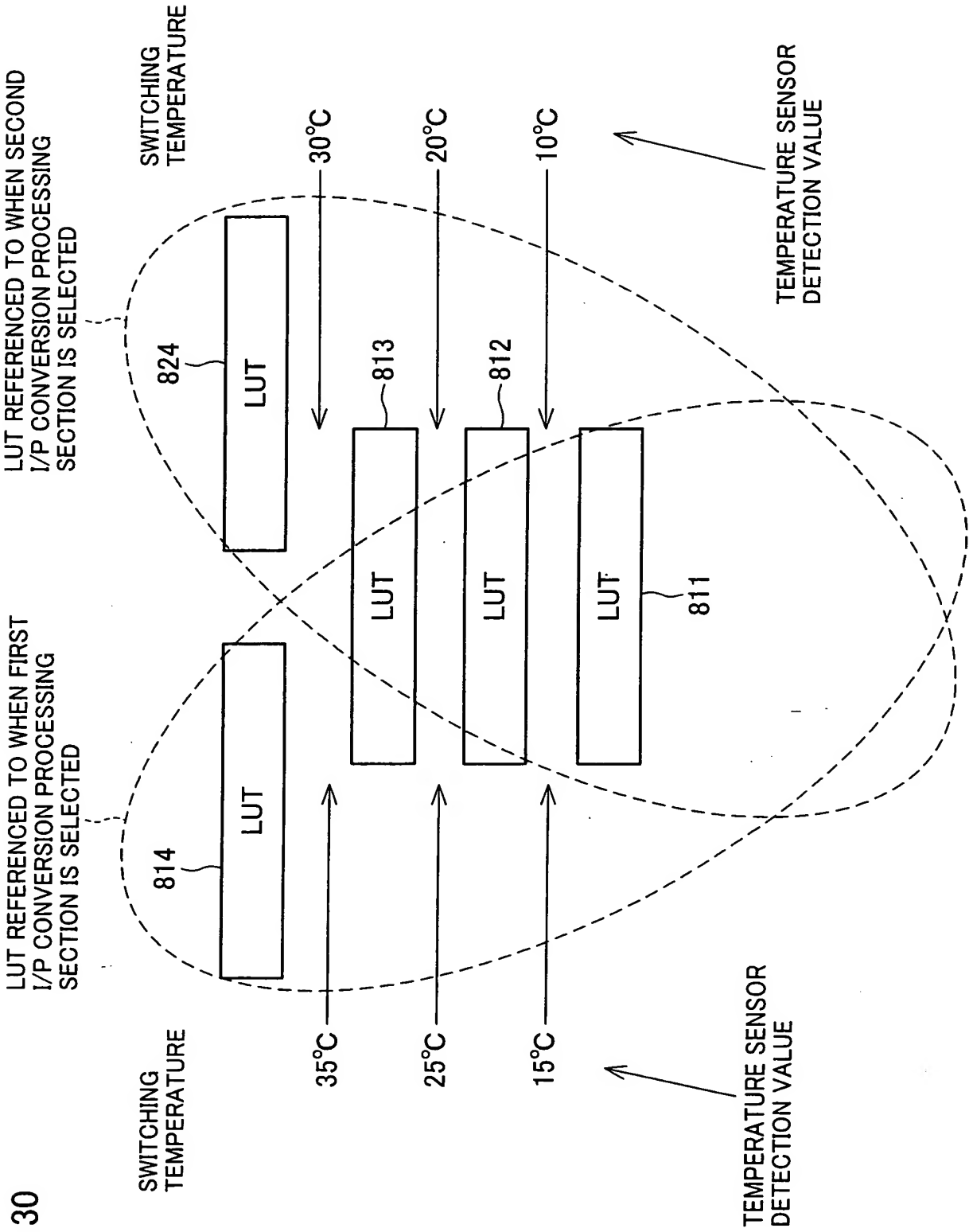

LUT REFERENCED TO WHEN SECOND I/P CONVERSION PROCESSING SECTION IS SELECTED
SWITCHING TEMPERATURE
30°C
20°C
10°C
TEMPERATURE SENSOR DETECTION VALUE
824
LUT
813
LUT
812
LUT
811
LUT
LUT REFERENCED TO WHEN FIRST I/P CONVERSION PROCESSING SECTION IS SELECTED
814
LUT
SWITCHING TEMPERATURE
35°C
25°C
15°C
TEMPERATURE SENSOR DETECTION VALUE

FIG. 31

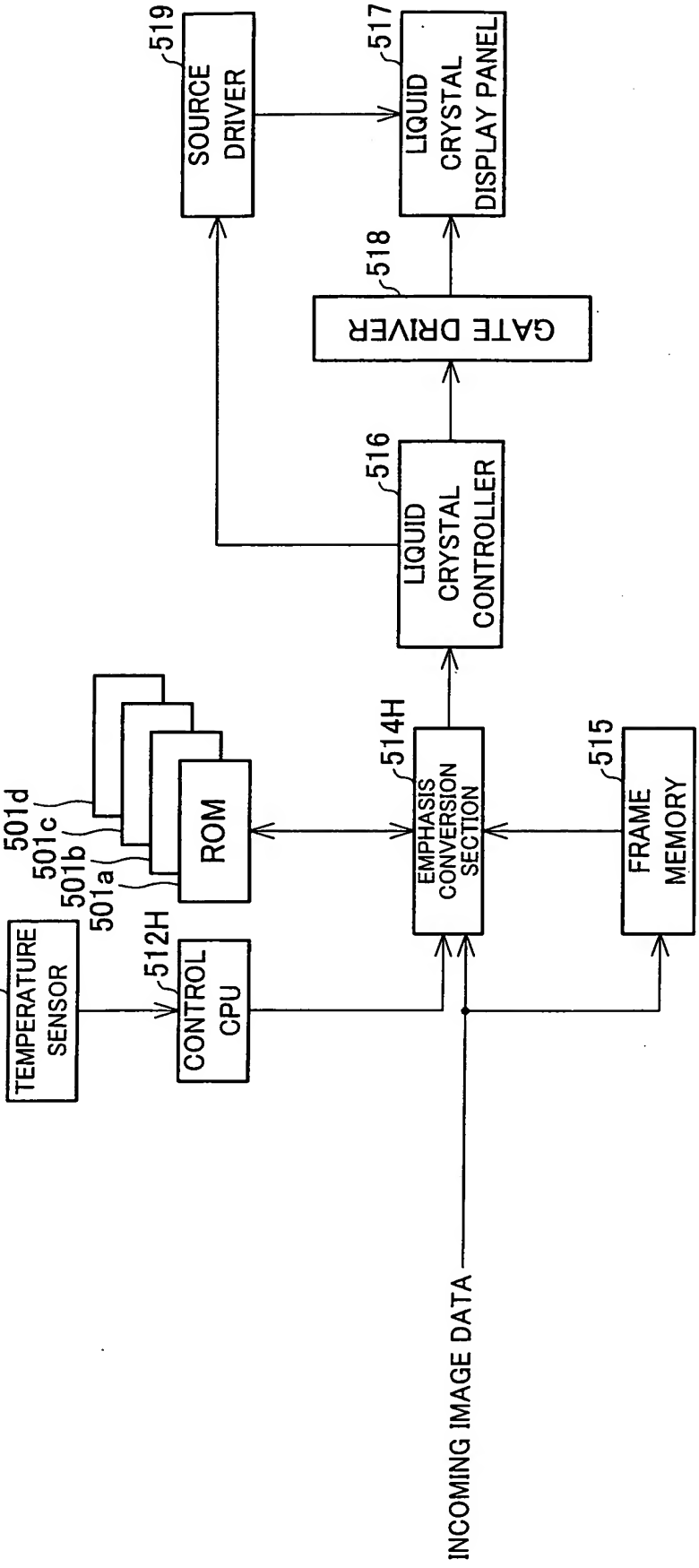

519
SOURCE DRIVER
517
LIQUID CRYSTAL DISPLAY PANEL
518
GATE DRIVER
516
LIQUID CRYSTAL CONTROLLER
514H
EMPHASIS CONVERSION SECTION
515
FRAME MEMORY
501d
501c
501b
501a
ROM
520
TEMPERATURE SENSOR
512H
CONTROL CPU
INCOMING IMAGE DATA

FIG. 32

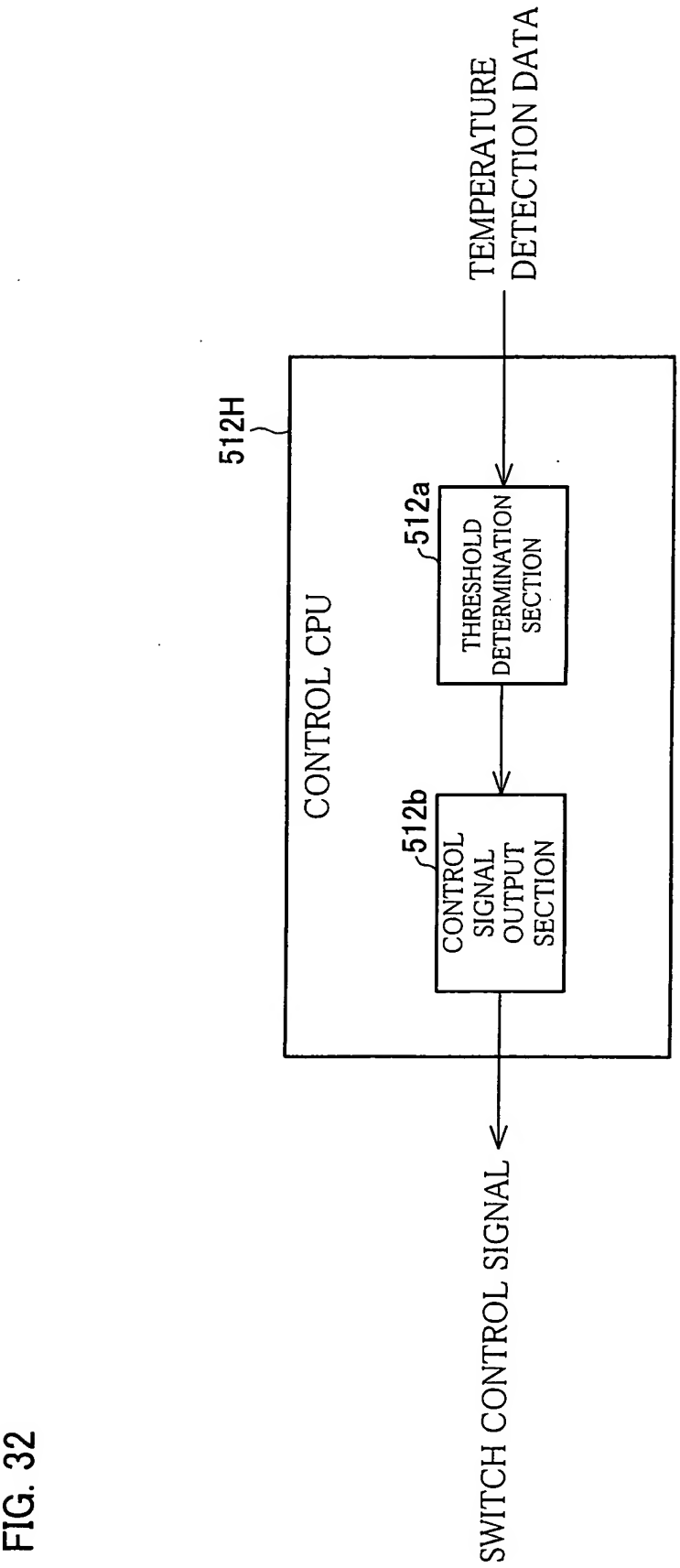

TEMPERATURE DETECTION DATA
512H
CONTROL CPU
512a
THRESHOLD DETERMINATION SECTION
512b
CONTROL SIGNAL OUTPUT SECTION
SWITCH CONTROL SIGNAL

FIG. 33

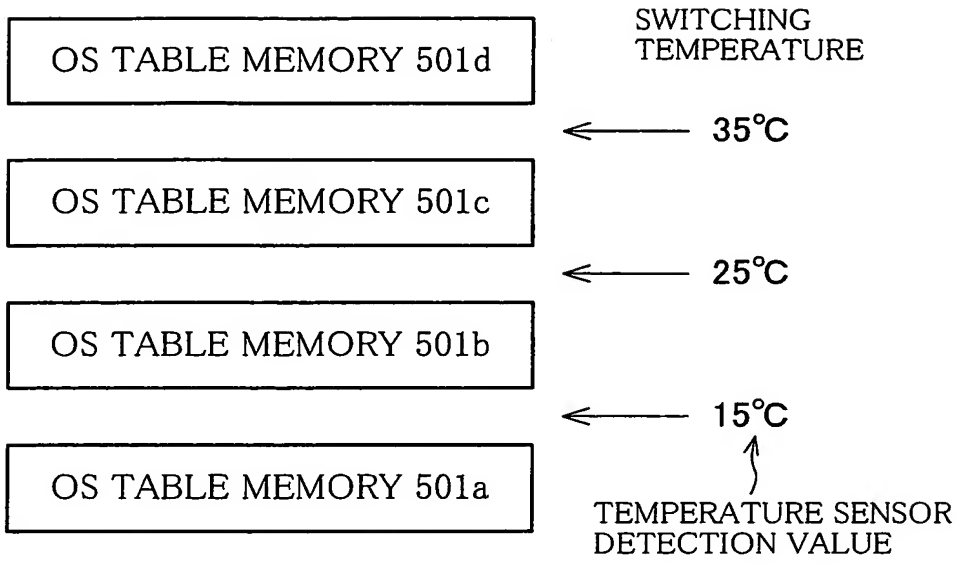

OS TABLE MEMORY 501d
OS TABLE MEMORY 501c
OS TABLE MEMORY 501b
OS TABLE MEMORY 501a
SWITCHING TEMPERATURE
35℃
25℃
15℃
TEMPERATURE SENSOR DETECTION VALUE

FIG. 34

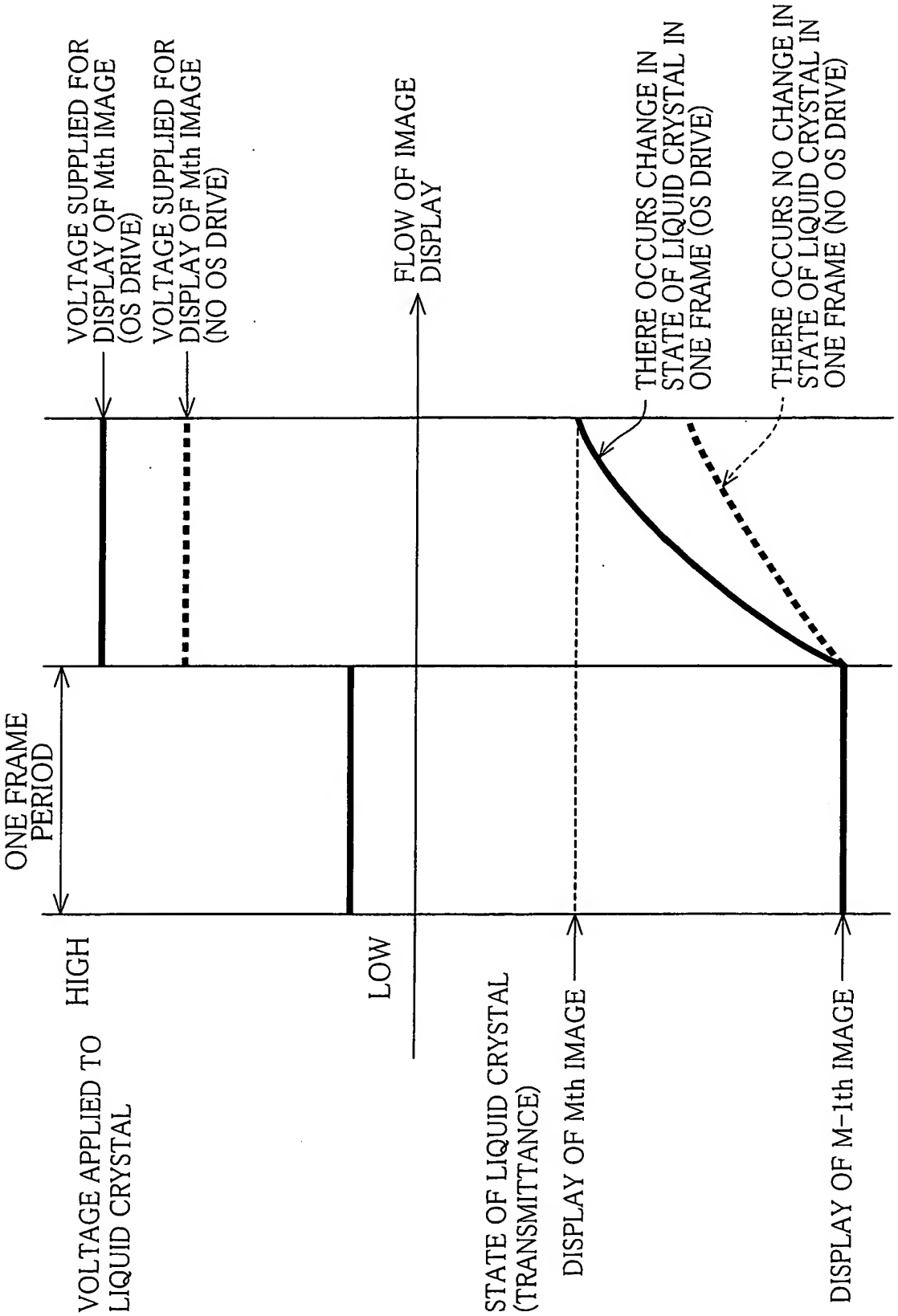

VOLTAGE SUPPLIED FOR DISPLAY OF Mth IMAGE (OS DRIVE)
VOLTAGE SUPPLIED FOR DISPLAY OF Mth IMAGE (NO OS DRIVE)
FLOW OF IMAGE DISPLAY
THERE OCCURS CHANGE IN STATE OF LIQUID CRYSTAL IN ONE FRAME (OS DRIVE)
THERE OCCURS NO CHANGE IN STATE OF LIQUID CRYSTAL IN ONE FRAME (NO OS DRIVE)
ONE FRAME PERIOD
HIGH
LOW
VOLTAGE APPLIED TO LIQUID CRYSTAL
STATE OF LIQUID CRYSTAL (TRANSMITTANCE)
DISPLAY OF Mth IMAGE
DISPLAY OF M-1th IMAGE

FIG. 35

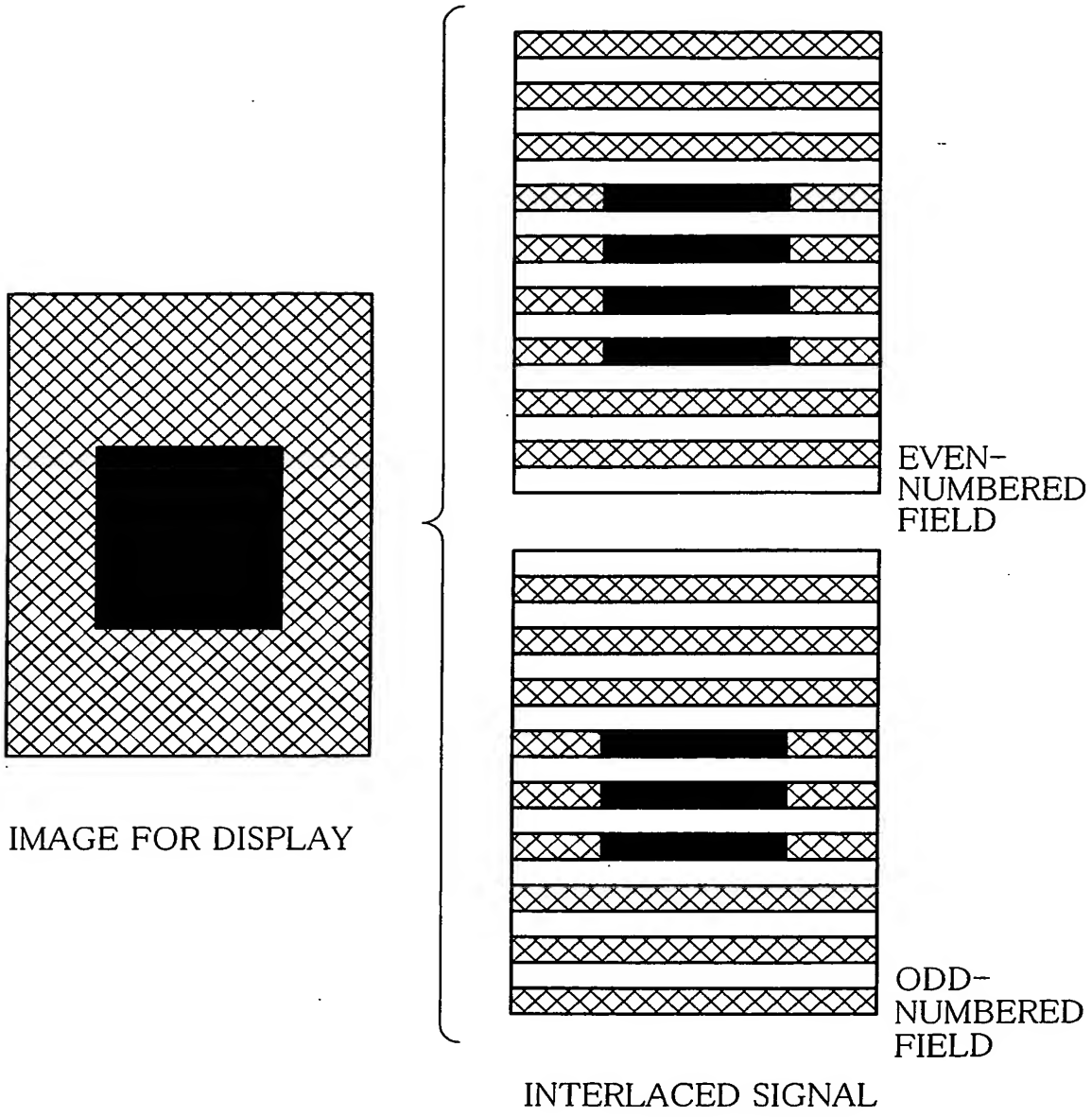
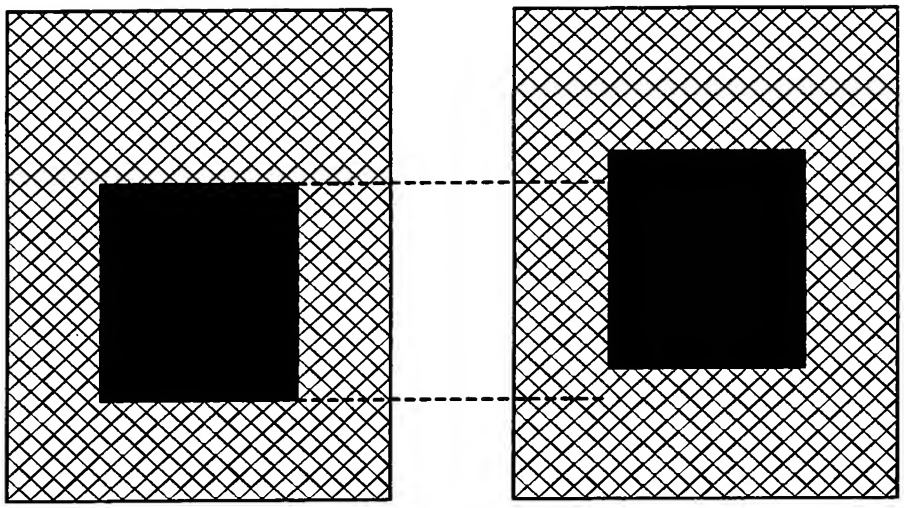

EVEN-
NUMBERED
FIELD
ODD-
NUMBERED
FIELD
IMAGE FOR DISPLAY
INTERLACED SIGNAL

FIG. 36



EVEN-NUMBERED FIELD ODD-NUMBERED FIELD